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# **Introducing the Pattern Book**

## **Welcome Jugglers and Friends**

Welcome to the *Madison Area Jugglers' Pattern Book*, a collection of club-passing patterns for intermediate to advanced passers. These patterns are part of our juggling repertoire. Many we learned or adapted from other jugglers; we include them because

it's fun trying to juggle them. But very many of the patterns in this book were born in Madison, Wisconsin, conjured up at Thursday/Sunday juggling sessions or at 47th Annual Madfests, annual events since 1992. The book offers some record of the evolution of club passing in Madison.

All jugglers are welcome to play with, use, distribute, extend, and otherwise enjoy all the club-passing patterns described in *Madison Area Jugglers' Pattern Book, Version 4,* which is licensed by its creators, the Madison Area Jugglers, under the [Creative Commons Attribution 3.0 Unported License](http://creativecommons.org/licenses/by/3.0/deed.en_US) . You may access the book [online](http://madjugglers.com), or check the latest updates at our [GitHub repository](https://github.com/wiscstatman/pattern-book). 

If you have questions, comments or suggestions relating to this book, please contact the Madison Area Jugglers. Where possible we have given credit to the creators of the patterns described here, though for many these origins were unknown to us. If we have erred in our attributions, please let us know.

This collection is a living document. New contributions are welcome for the next version, so please join the team and provide some pattern descriptions. ***give an easy instruction on how to add***

## **About the Project**

Originally we wrote down the patterns just to save time arguing over exactly how we did the pattern last time. (Don't worry...there's still plenty of arguing, even with the book.) We were pleasantly surprised to find other people found our book helpful too! The pattern book can be used as a club passing guide or just a library of the patterns that we originated or find interesting. If you're from Madison, then it's a handbook to what we do twice a week, on Thursdays and Sundays, and if you don't know the patterns already then you probably will. This book is not intended to be an encyclopedia of all possible passing patterns (that would be a big book)! In fact, we don't include patterns just because they are *theoretically* possible; we include them if we have done them!

The Madison Area Jugglers (MAJ) have been attempting, inventing, and recording juggling patterns for longer than most of us can remember. In 1997, when our memories were already getting strained by the variations, Michael Newton (aka Prof Mike) compiled our first *Pattern Catalogue* to record the patterns for four or more jugglers. This morphed into the first *Pattern Book* by him in January 1999, but the hand-written collection (*Version 0.1*) was in a pretty limiting format. By October of that year, Steve Otteson created the first computerized collection by reformatting and expanding Mike's hand-written notes. Melonhead still carries around a tattered printout of *Version 1.0*. Steve made a few version updates, for example adding a bunch of extra-club patterns by Peter Kaseman and Luke Emery; the unusual computer format of Steve's version and his departure from Madison slowed down subsequent updates, even though the MAJ continued to create new patterns at a steady rate. The next big contribution was Luke Emery's version (*Version 2.0*, 2012). Though it was not widely distributed, Luke's version contained all kinds of new additions: more patterns for all numbers of jugglers, more on site-swap, more on specialized extra-club patterns, and tips for creating and doing patterns.

In 2015 Matt Hemke and Evan Driscol created a Github repository for the project, converted Luke's version into a repo, and updated the collection further. Chan Wilson, Jeff Adamus, and Melonhead began tracking the patterns we do at Thursday and Sunday MAJ practices. It's an amazing collection, and for those who remember the code words, like *1-5-1 Foie Graham* or *4-5 Twister*, it's enough to figure out what we really did. But most of us forget the code words after a while, except for the frequently juggled ones, and this was an impetus for the *Version 3.0* update by Prof Mike in 2018. Since then, we've suffered through two years of COVID restrictions and two lost Madfests (only 1 lost if you count spring ‘22). But we kept juggling and discovered some cool new patterns that work well with face masks! Nathan Nard's rejuvenating and inventive contributions helped to launch *Version 3.1* in 2023.

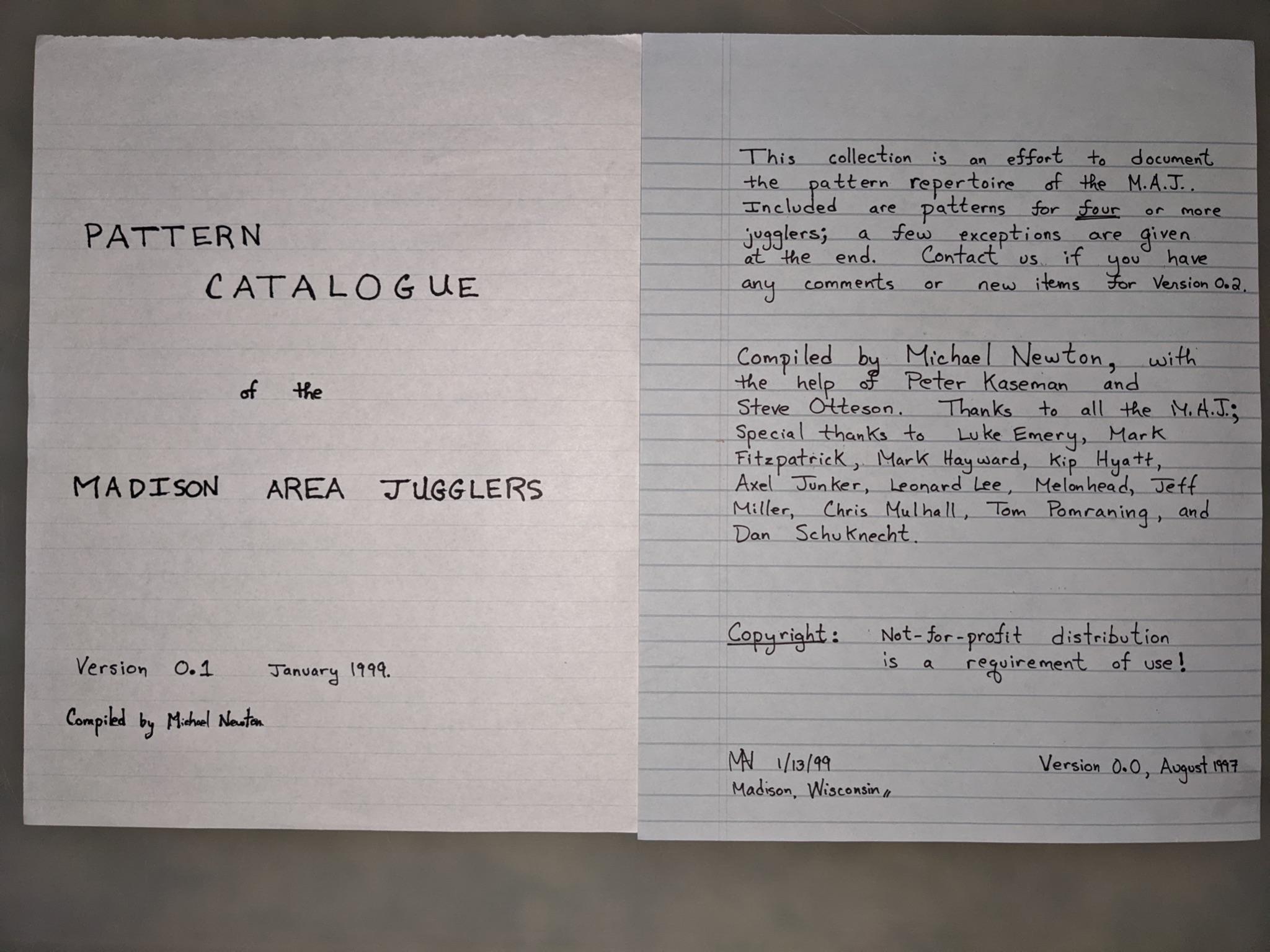
All along the editors have had substantial input from the Madison Area Jugglers and friends, and we are indebted to them for helping enhance this collection. Club passing

is a social pastime that needs a group of similarly inclined jugglers. Many of these patterns are inspired by other jugglers and patterns or created in collaboration with other jugglers. We hope that these patterns will help inspire new club passing ideas and help more jugglers all over the world enjoy club passing!

## **The Madison Area Jugglers**

***\*An intro paragraph or two on the MAJ\****

## **Version History**



\* Madison, Wisconsin, August 1997 Version 0.0

\* Madison, Wisconsin, January 1999 Version 0.1

\* Madison, Wisconsin, October 1999 Version 1.0

\* Madison, Wisconsin, January 2001 Version 1.1

\* Madison, Wisconsin, March 2001 Version 1.2

\* Madison, Wisconsin, January 2012 Version 2.0

\* Madison, Wisconsin, January 2018 Version 3.0

\* Madison, Wisconsin, January 2023 Version 3.1

**Updates in *Version 3.1****:*

We added a bunch of new patterns (e.g., *laxatives, the pollinator, the zigzag, sneaky-snake, that's-a-really-good-one, fully-loaded-blast, Mel's-dream*, and more). We added more on big patterns, including on the super-fun 24-person *hex-of-clovers*. At recent practices we've experimented a lot with colors, in which jugglers each start with a distinct set of clubs, and we see how long it takes to move the colors around. This version has some details on the substructure of a few of our cool patterns.

Thanks to Jeff Adamus for posting YouTube recordings of a bunch of our patterns; we've added links **\*where\* (Thanks to Jeremy, Jessie, and ? others for great camera work!) . \*other animations?\***

Like all earlier versions, the current version contains mistakes and unfortunate omissions, which we have yet to discover and for which the Editors take responsibility. We hope that future versions will correct these shortcomings.

### **Updates in *Version 4.0***

**\*\*google doc version..prep for real book…new patterns …more uniform pics/tabular descriptions\*\* [lead by MAN]**

## **The Editors**



Michael Newton (aka Prof Mike), Luke Emery, and the Madison Area Jugglers, especially (in alphabetical order): Jeff Adamus, Nick Aikens, Josh Casey, Steve Clipson, Evan Driscol, Mark Hayward, Matt Hemke, Peter Kaseman, Melonhead, Nathan Nard, Graham Paasch, Steve Otteson, and Chan Wilson. You can be an editor too by working on the next version!

# **Preliminaries**

## **How To Read Patterns**

There seems to be an indefinite number of ways a single juggler can juggle, so it's not surprising that a juggling *pattern*, which combines the efforts of multiple jugglers, can also take many many forms. There are many exceptions -- and we cover a lot of them – but to develop our intuition it's convenient to start with standard formulations. Say each juggler is throwing three clubs, alternating hands *right-left-right-left* etc, and juggling in sync with the others (i.e., all are doing *right-left-right-left*...). In this standard formulation, passes are single-spin exchanges between jugglers, either right-to-left or left-to-right throws. Even without adding extra clubs or unusual throws (heff's, zips, simuls, etc), there is an incredible variety of fun patterns found by varying where jugglers are and who passes to whom when.

## **Counts/Cycles**

A basic passing descriptor is the *count*, which tells the juggler how frequently to make a pass. In simple patterns each juggler's count is constant, but even simple patterns can be very difficult on a fast count. We say you are passing on an *m/n-*count if you make *n* passes in a cycle of *m* beats, counting on both hands. For example, 2/1-count means, *pass-self*, then repeat. When the denominator *n* is 1 we just say *m*-count, as in the familiar 1-count, 2-count, 3-count, and so on. Double-three count is a popular count, which in this notation is 3/2-count. Stating the count does not necessarily imply what hands are doing what, how many clubs are being juggled, or the starting configuration. E.g., left-hand 2-count is different from right-hand 2-count. Odd counts (i.e., odd *m*) are nicely balanced for the hands; then the only issue is the start, which we usually do out of the right.

Mortal jugglers, like us, can only do patterns that repeat. That repeatable unit is called a *cycle,* and it takes some total number of beats to complete on whatever is the base count of the pattern. Patterns with longer cycles are usually harder to remember and therefore harder to do, but not always. In many patterns each juggler does something relatively simple (i.e., a shorter *local* cycle) even if the whole pattern takes a long time to complete. Those are cool!

In this edition of the pattern book we introduce two exceptions that prove the rule about pattern cycles. Mark Hayward’s 6-person *Kill Screen* is the first. Its beautiful design assures that the pattern collapses in a mass collision at precisely 37 beats in! Usually this is accompanied by a great cheer, celebrating successful completion of the pattern. The second exception is the 4-person *Unending Clover,* which has an infinite cycle length, thanks to its alternation of ever-longer segments of right-hand then left-hand two count (we’ve yet to complete a cycle!).

Throw timing, throw destination, and juggler position over time have to be recorded to describe a juggling pattern. We use tables and figures to express this information. For

example, the table below (right) describes a standard feed, with jugglers (letters) on the rows and passing beat (numbers) on the columns. We sometimes reverse row and column for complicated (longer-cycle) patterns. We often accompany the table with a simple figure showing how the jugglers are positioned (left). In moving patterns (later) we also indicate positions and transitions with a nodes-edges graph.

## **Tables**

**Name of Pattern**

| LAYOUT  *where the jugglers are in space* |  | **Beat, base count** | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Juggler** | **1** | **2** |  | **…** |  | **N-1** | **N=Length of cycle** |
| **A** |  |  |  |  |  |  |  |
| **B** |  |  |  |  |  |  |  |
| **…** |  |  | *Who passes to whom* | | **wh** | | --- | |  |  |  |
|  |  |  |  |  |  |  |  |
| **Last juggler** |  |  |  |  |  |  |  |
| * Helpful comment #1 * Helpful comment #2, * …   **Metrics**: | | | | | | | | |

The patterns we describe require jugglers to sync up. Commonly, this has everyone releasing a club from the right hand at the same time, and likewise everyone releasing a left at the next time step. For some patterns with extra clubs, there is still a syncing of releases, but with a subset of jugglers releasing from the left hand while others are releasing from the right. In either case, these patterns have a **base count** which refers to a way of counting the time steps of these releases (see notes previous section). For instance, right-handed 2-count is a common base, or right-handed 4-count, or a variety of more interesting counts (e.g., 1-3 on a 5 count). Typically passes happen on the named count, though not every juggler may be passing. And we may have time steps (beats) on that named count where no-one is passing. Patterns can be described in different base counts; often when learning a more complicated pattern we start with a slow base (e.g. 6 or 8 count), and then speed it up to a faster count as we learn. For convenience, we usually describe a pattern in base count that squeezes away the most all-self beats.

Other pattern descriptors can be more detailed and informative, and these are good for elaborate passing between 2 or 3 jugglers with extra clubs. But most of what we describe in this collection does not aim to record, for example, the state of every club at every time. Primarily, we are content with knowing who throws to whom when, and where everybody is. (But see Chapter \*\* with Nathan’s piano rolls to see a neat variation where all the clubs are tracked in elaborate patterns; we use these rolls to figure out the full cycle of a pattern; i.e. the number of beats to get back to the beginning.)

**Examples**

**Standard feed (aka windshield wiper)**

|  |  | **Beat, right hand counting** | | | |
| --- | --- | --- | --- | --- | --- |
| **Juggler** | **1** | **2** | **3** | **4** |
| **A** | **B** | **C** | **D** | **C** |
| **B** | **A** |  |  |  |
| **C** |  | **A** |  | **A** |
| **D** |  |  | **A** |  |



*Right hand counting* refers to a 2-count base count, starting with rights. Only the right hand throws are tabulated in columns. The column under each number indicates the jugglers that pass at that time. More specifically, an entry in a row/column is the juggler who receives a pass from the row juggler at that time beat. Since left hand passes are not made in the standard feed, they are not tabulated; self throws are indicated with a blank entry.

For example, if I was juggler **C** in the above pattern, I would read along the 3rd row to see where to pass. On the first pass (column 1), I have a self throw (the empty box represents a self throw). For the next right-hand throw (column 2), I pass to **A**. For the next two right-hand throws, I do a self throw followed by a pass to **A**. The table rolls over, so that the fifth pass is the same as the first; i.e. the pattern has a 4-beat cycle.

We can tabulate the same pattern in different ways; ignoring the layout, the following two tables describe the same pattern:

|  | **Beat, right hand counting** | | | |
| --- | --- | --- | --- | --- |
| **Juggler** | **1** | **2** | **3** | **4** |
| **A** | **B** | **C** | **D** | **C** |
| **B** | **A** |  |  |  |
| **C** |  | **A** |  | **A** |
| **D** |  |  | **A** |  |

|  | **Beat, both hands counting** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| **A** | **B** |  | **C** |  | **D** |  | **C** |  |
| **B** | **A** |  |  |  |  |  |  |  |
| **C** |  |  | **A** |  |  |  | **A** |  |
| **D** |  |  |  |  | **A** |  |  |  |

Unless otherwise specified, all passes are single spins and do not cross. (We often say so in the extra notes!) Doubles and triples to juggler **A** are indicated by d-**A** and t-**A** respectively and are also straight unless noted. Special instructions like different counts, double selves, crossing passes or starting instructions may be noted in or below the table.

**Typewriter Extra Club Feed (13 clubs)**

|  | **Beat, both hands counting** | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** |
| **A** | d-**D** |  | d-**C** |  | d-**B** |  |
| **B** |  | d-**A** |  |  |  |  |
| **C** |  |  |  | d-**A** |  |  |
| **D** |  |  |  |  |  | d-**A** |

* All jugglers make right hand double (d) passes.
* **A** starts with 4 and right hand
* **B**, **C** and **D** start with left hand

Here's an example with double straight passes and special instructions. In this case all the passes are right-handed passes, but we count both left and right-hand throws. A throws right Double pass to D, then left self, then right Double pass to C, then left self, then right Double pass to B.

*How to tip: Jugglers C and D should throw a little higher and deeper so A has*

*room to pass underneath to C and B.*

**A Funny Left/Right Box**

|  | **Beat, both hands counting** | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** |
| **A** | **B** | **C** | **B** |  | **D** |  |
| **B** | **A** | **D** | **A** |  | **C** |  |
| **C** |  | **A** |  | **D** | **B** | **D** |
| **D** |  | **B** |  | **C** | **A** | **C** |

The above pattern has both hands counting, so the column under 1 is a right hand pass, the column under 2 is a left hand pass, etc. If I was juggler **D**, I will read the fourth row to see that I start with a right hand self (column under 1), followed by a left hand pass to **B** (column under 2). The next 4 throws are: right hand self, left hand pass to **C**, right hand pass to **A**, and a left hand pass

to **C**. Then the pattern repeats.

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## **Messing with the Base Beat**

We’ve had immeasurable fun sorting out juggling variations by changing who passes to whom when and who moves where when. Recently (subsequent to Version 3.1) (say around 2024), we have experimented a lot with patterns that share both positions-over-time and the passing sequence of a standard pattern, but they vary specific beats when these passes happen.

For instance, a standard 1 vs 3 feed could be described as having passes at “1 on a 2 count”, which is at beats 1, 3, 5, 7 counting both hands. In “1-3-on-a-5 count”, by contrast, the feeder **A** and the feedees **B, C,** and **D** pass as before, but there’s no passing on beats 2, 4, or 5 within each 5-count base cycle (non-passing are shaded). **A** passes right, self, right, self, self, left, self, left, for example, thus extending what was an 8 beat (both hands counting) full cycle to a 10-beat full cycle. Notice that the time gaps change between passing beats, if we just stack columns of the table where passes happen and delete all the grays, then the reduced table does not change. This messing with the base beat gets really interesting in some of the moving patterns.

| **Standard feed of 3, messing with the base: “1-3-on-a-5 count base”** | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Beat, both hands counting** | | | | | | | | | |
|  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| **base** | **1** | **2** | **3** | **4** | **5** | **1** | **2** | **3** | **4** | **5** |
| **A** | **B** |  | **C** |  |  | **D** |  | **C** |  |  |
| **B** | **A** |  |  |  |  |  |  |  |  |  |
| **C** |  |  | **A** |  |  |  |  | **A** |  |  |
| **D** |  |  |  |  |  | **A** |  |  |  |  |

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## **Site Swaps**

\*\*I THINK WE NEED TO SAY WE REALLY DON’T TAP INTO THIS WORLD IN THIS BOOK, EXCEPT FOR A FEW EXTRA-CLUB STATIONARY PATTERNS\*\*

Occasionally we tap the wonderful world of site-swap notation https://en.wikipedia.org/wiki/Siteswap to describe patterns. For example, 7 club 2-count is 4p 3 | 3 4p (2<sup>nd</sup> juggler starts with left hand). There are a number of different site swap notations out there for passing. We use whatever seems to make sense to us at the moment and make no guarantee of consistency!

## **Glossary: Secret Juggling Code Words and Phrases**

**baby position**. The least challenging task in a juggling pattern, if there is one.

**Bernardos**. Unnecessary solo juggling tricks performed while other jugglers are trying to start a pattern. Named after Paul Bernardo, an expert of the craft.

**Canadian catch**. An impressive catch that would have been difficult for most mortal jugglers. (Guess who that’s named after!)

**carriage return.** A style of feeding where the feeder returns to the first feedee in the line after passing in sequence to all feedees. (also called typewriter)

**chalant.** To drop a perfectly fine pass due to lack of focus. The opposite of nonchalant.

**chocolate bar.** *pass--pass--self--self*; a 4/2-count. By convention, this starts with the right-hand pass.

**CJ**. clubs per juggler. Property of a juggling pattern equal to the total number of clubs divided by total number of jugglers. (Also a star in *Bay Watch*.)

**colors.** The restriction that each juggler starts the pattern with a visually distinct (usually by color) set of clubs.

**cross.**  A left-to-left or right-to-right pass.

**cycle.** The amount of juggling after which the pattern repeats. (See global or local versions)

**Doc Blanchard/Glenn Davis.** Mr. Inside/Mr. Outside. (Now, Dr. Inside/Dr. Outside!)

**double 3-count.**  pass-pass-self: Academics insist that this is a 3/2-count not 2/3-count.

**Dr. Inside/Dr. Outside.** The two feeding positions of a doubly-fed weave (formerly Mr. Inside/Mr. Outside.)

**encroachment**. Premature lane-crossing between two passing jugglers in a moving pattern. Usually entails a 5-yard penalty.

**everies.** 2-count

**every-others.** 4-count

**exclusion principle.** No two jugglers can occupy the same place at the same time.

**extra clubs.** When the number of clubs for the pattern exceeds three times the number of jugglers.

**feast**. A pattern having only feeders, usually arranged in a circle.

**feed.** A passing configuration where one juggler passes to multiple others.

**feedee**. One who passes with a feeder.

**feeder.** One who feeds. Usually this juggler is stationary.

**global cycle:** Number of beats before the whole pattern repeats.

**hup**. The vocalization that signals the end of the pattern.

**immaculate assumption.** When you think that a juggler is about to move or pass...maybe they even give you the look...you know, the \*\*look\*\*...but then they don't!

**Inverted**. A non-standard moving convention in a weave: move forward on the end and back through the middle. The standard convention is back on the end forward through the middle.

**I blame society**. An excuse for some juggling failure (usually by Mel).

**last jugglers' try.** The last attempt at a pattern, but only if it goes well enough.

**leader.** One who calls out, *jugglers ready: up, down, ...* at the beginning of a pattern.

**local cycle:** Number of beats before a juggler repeats what they’re doing in a pattern.

**Mel catch**. The act of catching the fat end after a 2.5 triple up.

**mustard**. Energy, power, spice, velocity or chi added to throws. As in, "Your corner

passes need more mustard." Also, crispy. The opposite of mustard is mayonnaise.

**NFP.** Nice Pass.

**No, this is a club**. Said while pointing to a juggling club and talking to a curious

passer-by who asks about the group, "Is this a club?".

**OJ.** The number of *other jugglers* passed to in a pattern. Also a refreshing drink.

**olive**. In a stacked, sandwich-style pattern, a single feeder on one side of the pattern.

**orbiter.** A juggler who orbits a standard moving pattern and passes to others on some of their would-be self throws.

**phantom**. A feedee placeholder who isn't really there. A feeder, for example, may feed 2 real feeders and a phantom in a sweep feed: *pass-pass-self-pass* and repeat.

**PBJ.** Passes per beat per juggler. A statistic to measure one aspect of the difficulty of a pattern. Measured relative to a 1-count base beat per local cycle, and is a fraction in (0,1]; literally # passes divided by # beats in a local cycle. (Also a favorite sandwich!)

**pH.** Pass height per throw (e.g., 1 for singles, 2 for doubles, etc). Also a measure of acidity!

**plus**. A suffix added to indicate an extra club added to the base pattern.

**post.** A stationary orbiter.

**run it.**  Continue juggling for an indefinite number of cycles.

**scheisse**. An utterance of frustration, possibly by Dan Schuchnect.

**Someone passed me a bad self**. An excuse for dropping.

**southern Wisconsin convention**. When changing sides from a feedee position in a standard count, do so on an outside-throw/inside-catch; e.g. on a right-hand throw/left-hand reception when on the right side of the feedee line.

**spin**. A statistic to measure one aspect of the moving difficulty of a juggling role within a pattern, measured as the total absolute change in angle per cycle (radians preferred!). (See pattern metrics.)

**straight.** A right-to-left or left-to-right pass.

**sweenish**. A fancy final move in a pattern, preferably clean.

**three-count.** In Madison, the default passing count between two jugglers. Sometimes called the *waltz*.

**tomify.** Replace a pass-self or a pass-self-self with pass-pass-pass to the same recipient. (thanks Tom Pomraning)

**triple up**. The showy last action in a pattern, after the hup, in which each juggler lofts a triple self.

**ultimate**. 1-count

**walk it through**. To perform a slow-motion instance of a pattern, with juggling replaced by the holding of clubs, with passes replaced by pointing to where you would pass, and following a slow, deliberate count by the leader. Done while setting up a pattern in order for jugglers to figure out what they are supposed to do.

**weave.** A most popular moving pattern with three feedees and a feeder, which is the basis of many multi-person patterns. The 3 feedees move in a figure 8 while juggling.

**windshield wiper.** The more common style of feeding where the feeder first feeds the line in sequence, and then returns in reverse order. Windshield wiper and carriage return are the same with two feedees, but differ for three or more feedees.

**who passes to whom graph.** A graph-theory construct with nodes per juggler in the pattern and directed edges from passers to (non-self) recipients. Clubs follow paths in this graph as the pattern is juggled.

**wuss.** The amount of gentleness, tenderness and love added to a juggling throw. Compare to mayonnaise. Also, the quality of passes you would make to your favorite

grandmother. As in, "Please add some wuss to your middle passes. You're hurting my catching hand!"

**You herniated my ZOC**. Said if a pass forced extension and excessive effort in the catching.

**ZOC.** Zone of Catchability. The volume near a juggler in which successful catches are probable, as in, “Peter Kaseman has the largest ZOC in Madison.”

**ZOOS**. (sounds like the Greek god Zeus) Zone of occupied space. Space occupied by a moving juggler.

## **Random Tips on Passing Patterns**

*Better never than late.*

If you miss a passing beat, don't pass on the next throw! Instead, wait for the pass opportunity to come around again in the regular cycle of the pattern.

*Always keep your eye on Mel*.

Don't pick up the clubs until you're sure the pattern is over, unless you know you can pick up and keep juggling. Even when you're not juggling, it's wise to keep an eye on Mel.

*Juggle slow, move fast*.

You get it. There's a tendency to speed up your juggling when you move. Don't.

*Lift your selves.*

So you slow down!

*Juggling means never having to say you're sorry.*

No, really. Don't say you're sorry unless you draw blood. However, if you draw blood then you do have to say you're sorry.

lots of passing! If people want to do a hard pattern that is too advanced

for beginners then they will, and you'll be left out of that one. Just do a

pattern with somebody else. If we're juggling with you it's because we want

to, not because we have to. Most patterns have positions of varying skill

requirements, so if you're a beginner in a bigger or more advanced pattern,

we'll try to put you in the best spot for your level. Just try to do the

best you can, and if you drop, try to keep the timing anyway.

*Mike's the leader*.

Unless he's not.

*Throw global, catch local*.

A prescription for happy passing.

*The wind is our friend.*

Remember this when juggling outside.

## **Pattern Metrics** *(New in Version 4.0)*

Juggling patterns can be difficult to master for lots of reasons. Here are a few properties we keep track of to help us think about different kinds of juggling patterns. Table \*\* reports these properties for the patterns collected in this edition.

**Number of Jugglers :** self explanatory. To avoid trivialities, the who-passes-to-whom-graph (see glossary) has to be connected, otherwise we consider the connected components to be separate patterns; i.e. having a solo juggler in the middle of a pattern doing tricks but not passing to anyone does not count as a member of the pattern, at least by the MAJ rules! (Well we make a few exceptions when passing lanes overlap, such as in *boxes* or the *hex*!)

**Clubs per Juggler :** Total number of clubs divided by total number of jugglers in the pattern (larger is usually harder!) Equals 3 for most basic patterns! (Also a character in *Bay Watch;* Remember Borat’s refrain, “Be careful CJ!”)

**Cycle Length:** number of counting beats (in the base count) that occur until a pattern repeats. Patterns with longer cycles tend to be harder, well at least they are harder to remember!

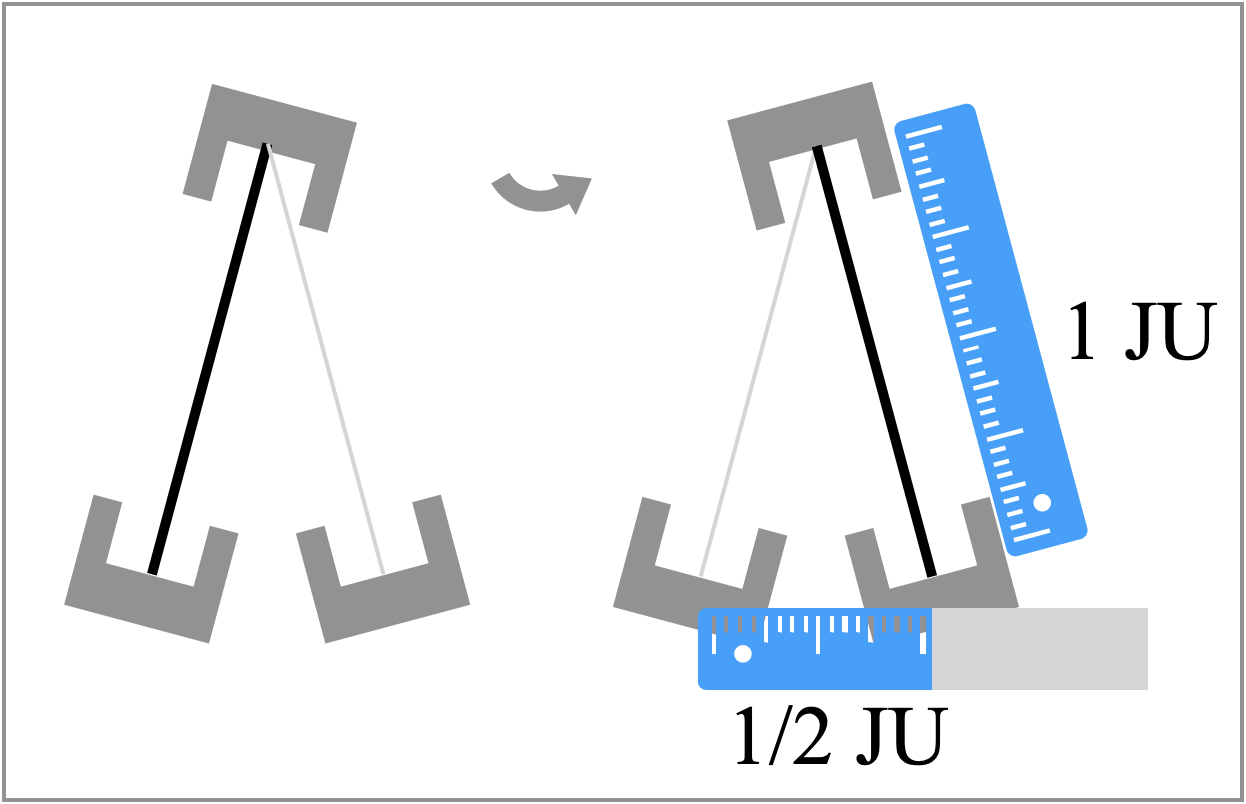
**Passes per Beat per Juggler :** This is the number of passes divided by the number of 1-count beats in a full cycle. It’s a number in (0,1], with larger numbers usually corresponding to more difficult patterns. PBJ is specific to each role in a pattern, and its average over jugglers is a pattern-specific difficulty measurement (also a good sandwich!). (Note, avoiding 0 is related to not counting superfluous non-passing jugglers above!). PBJis also the proportion of all releases (passes and selves) that are passes to another juggler; so it’s one minus the proportion of all releases that are self throws.

**Other Jugglers :** number of passers per passer, averaged over jugglers in the pattern (greater than 0 and less than or equal to the number of jugglers minus 1). (Average degree in the who-passes-to-whom graph, ignoring edge direction.) Also a refreshing drink!

**Pass Heights** *pH***:** We take this to be 1 in non-extra-club patterns, and the average spin associated with each passed club (e.g., 2 for doubles, 3 for triples, etc). Mortal patterns tend to be acidic, with pH below 3!

**Motion, in juggler units :** A measure of distance traveled during a juggling pattern. When two jugglers meet to pass, the typical (i.e., comfortable) distance between them is one JU, by definition. It’s 6 to 8 feet, or so (in earth’s gravity), possibly more for extra clubs. By our calculations, two jugglers standing side-by-side as feedees in a pattern are about ½ a JU apart (between their centers of mass, say!). You cover about 1 JU when you switch sides in the *switch-sides feed.* We estimate that weavers set up at about JU apart (i.e. a bit more than in a stationary feed), in order to have room to move, for example. Different models of motion give different results. For instance, a weave could be viewed as side-by-side circles, each of diameter JU, which gives a total perimeter for one cycle equal to 4.4 JU. On the other hand, the weave may be more shallow than that, like a lemniscate, with perimeter JU. Splitting the difference to be pragmatic, we consider a weave motion to be about 4 JU, and likewise any two jugglers moving around each other (e.g., like a pair in an *Eggbeater*) cover a motion of about 2 JU per cycle. These motion metrics are approximate, of course. They are useful when we set very large patterns and need to know what fits in a given space! They might also be good if you are keeping track of steps!

**Roles, R:** The J jugglers in a pattern take on some number R of different roles. For instance R=1 in a *Feast,* since everyone does the same sequence over the course one cycle a pattern, even if possibly out of phase or in different positions. In a *Standard Weave*, there’s a feeder and three weavers, and thus J=4 and R=2. To keep things simple, we don’t use handedness to distinguish roles; a right-handed 2-count is the same in this regard as left-handed 2-count. But jugglers who perform a different count sequence, modulo the pattern cycle, have different roles. In two patterns with other metrics being the same, the one with larger R might be a good choice when you have jugglers with different skill levels in mix, since surely some roles will be harder than others. Tracking R is also a surrogate for tracking the variance of the juggler-specific metrics like *PBJ*, *motion,* or *spin*.

**Spin:** A measure of how much turning you do to complete a juggling pattern, reported in total angle traversed through the pattern (allowing changes in direction), and measured in radians (because we’ve always liked radians better than degrees)! Initially our model held that stationary patterns or moving patterns lacking directional change (like a weave) have zero spin. However, this is a poor approximation to real patterns whose difficulty is related to the amount of a juggler’s rotation. We recognize that jugglers do some rotation in most patterns; exceptions are like the standard *Box*, where each juggler passes only to someone directly opposite them. Even a simple feed with two feedees (left) entails a small rotation on the part of the feeder. Considering that feedees set up about ½ JU apart, and considering a circle of radius 1 JU has perimeter just over 6 JU, we estimate the feeder rotates about 2/12 radians going from one feedee to another. Going back and forth to complete the cycle means the feeder’s spin is /3 radians (i.e. 30). The feedees have 0 spin, so we assign spin to the pattern equal to the average spin of its jugglers. This simple *1-feeds-2* has spin /9 radians. *Mel-in-the-Middle* is 3 person pattern with jugglers set up in a line, the two ends facing and the middle juggler (Mel) facing one of the ends. The ends don’t spin, but the Mel in the middle does two ½ pirouettes to complete a cycle, making the pattern’s spin /3. Spin becomes a big deal in some of the moving patterns. Being able to rotate while you juggle is a great skill, so having this spin metric allows us to distinguish pattern difficulty according to this skill.

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## **Mastering the Craft**

**Timing:** It may already be obvious, but good timing is critical to group passing patterns. One of the best tools to keep timing is your ears. For many patterns, the catches should happen at the same time. When the juggling is well synchronized, the sound of catching clubs is a metronome for the pattern. Otherwise, find a juggler in your field of vision and make sure you throw at exactly the same time as they do (either passes or selves). Make sure all the passes of the same spin go to the same height. For many patterns, selecting a juggler to count out loud as a metronome can be very helpful. And follow the leader!

*MAJ timing*: We estimate 0.9 seconds per right-hand-beat for no-extra-club passing. This is a little slower than at most North American sites and a little faster than at some European sites! It’s a tempo of about 67 beats per minute. This slower timing is especially beneficial in moving patterns where there’s a lot of other things to do aside from throwing clubs! Lift your self throws to slow down.

**Leads:** The second most important skill is for the passer to lead the catcher in the direction they are moving. The amount of lead varies based on the height of the throw, the tempo of the juggling, and how fast the weaver is moving. Outside leads are the easiest, because they are thrown away from the catcher's pattern. Inside leads are trickier, because they are thrown towards the catcher's pattern, and if the passer is exchanging clubs with the catcher, the two passes are prone to collision. (For some patterns, such as the *Cyclone*, the weavers are

moving so fast that the inside leads go all the way on the other side of the incoming pass.)

One key to throwing good leads is to be able to see where your passes land. That's a difficult skill at first, and especially hard for some patterns with high throws, but your target will certainly appreciate the effort. Otherwise, good communication (especially for dropbacks or other blind passes) helps fine tune lead throws. Remember that in a feed, the feedee on the same side as the feeder's pass must throw an inside and/or deep pass to give the feeder room to throw underneath to the next feedee.

**Turning:** Twister weaves and other fun patterns are all about turning. In general you can classify how hard a moving pattern is by how many selves are allocated to turn 180 degrees (i.e., radians). For example, the *Standard Twister Weave* has 5 selves (weaving in 6-count). The *Fast Spiral* has 3 selves (weaving in 4-count). The *Chocolate Swirl* has 1 self (crossing sides in double 3 count). (Note this difficulty is related to the spin and PBJ numbers, which accumulate properties over the whole cycle of a pattern.)

In most cases, you can turn either to the outside or the inside. One turn is usually easier than the other, but we recommend jugglers learn both turns whenever possible. Learn turning in easy patterns like the *Twister Weave* and then you can apply those to *Clovers* or *Strange Attractors* and other more advanced weaves. It is also helpful to practice turning while juggling solo. How many selves does it take for you to turn 180 degrees while spinning continuously?

**Learning:** Take advantage of opportunities to pass with jugglers better than you. That's how you'll learn timing. Take advantage of opportunities to pass with jugglers less skilled than you. That's how you'll learn catching. Be sure to pass with jugglers at the same level as you. That's how you know how good you really are. :)

Lots of passing patterns benefit from solo skills too. You'll need to be able to juggle 4 clubs comfortably in triple singles, double singles and the fountain to do a lot of the 7 and 8 club based passing patterns.

## **Passing Pattern Philosophy**

We're occasionally asked at juggling conventions, where do you come up with all these patterns? Actually, they sort of make themselves once you invite the opportunity. Here are some tips on how to make new passing patterns and have fun doing it. We discuss some other pattern generation techniques in Chapter 12.

**Mutate**

* Start with a classic juggling pattern or any geometric figure (box, triangle,

star, Y, W, line, etc.).

* Think about everybody juggling 3 or 4 clubs.
* Replace any selves with a pass to another juggler doing a self.
* Switch the positions of jugglers, but retain the passing sequence.
* Try the same movement in a different count, or left handed.
* Try the same passing sequence in a different movement.

**Complicate**

Why not make things harder? You get better at basic patterns if you try harder variations; plus they can be interesting if they're not too hard. (We estimate that a success rate of 1/3 is optimal for making progress and retaining interest!)

* Replace any 3-count with a double 3-count.
* Replace any feed with an extra club feed.
* Replace any extra club feed with a 2 extra club feed.
* Make stationary jugglers move (circles, clovers, figure eights, or any juggling siteswap just to name a few).
* The clubs can be passed in any juggling pattern or siteswap (admittedly, patterns get challenging quickly once you get past the easier siteswaps).

**Combine patterns** (\*Mating\*): Replace any position with a set of jugglers that spits out that same count. E.g. replace one person doing a 4-count with one side of a *Twister Weave*; or replace a 2-count person with a *Weave* (assuming there is room!). This is the source of many fun big patterns, such as the *Egg-Beater-Twister*.

**Stacking:** Weaves-of-three and spinning-pairs are pattern components that emit passes on either side of a line. They are naturally combined into multi-layer patterns by stacking them up against each other in parallel. Then feeders (sometimes called *olives*) or same-facing movers anchor either end of the stack. We get simple descriptors for quite elaborate patterns, such as 1-2-3-2-1, or 1-2-2-2-2-2-1. (See later chapters for more details.)

**Starting:** There's nothing that saps mojo more than a long discussion about how to start or progress through a pattern. Keep instructions simple, informative, and clear. Warm up by doing parts of a pattern in isolation. Walk it through and minimize the Bernardos.

For very big patterns, we use two decks of playing cards: one is used to mark starting positions by taping cards to the floor; a matched set from the second deck is handed out to the participants. The leader just instructs jugglers to find their positions, and they usually self-organize! We also use tape on the floor to mark movements or passing lanes to keep it clear. And we’ve found that a jazzy metronome can help keep jugglers in time. (We tried a few times having a live drummer; that makes for a lot of fun and entertainment, but it did not really help our timing!)

**Make it interesting**

* Many of our favorite patterns are group collaborations where lots of people gave ideas for new ways to move or pass.
* Share your favorite club passing patterns with other jugglers and listen to their ideas too.
* Recognize the skill level of your participants and do patterns in which everyone can be challenged while also having fun.

Antonio Vivaldi, in 1725, titled his Opus 8, 12 Concerti for chamber orchestra and

violin,  *Il cimento dell'armonia e dell'inventione*, or, *The contest between harmony and invention*. (Thanks Rick Chappell for this quote!) There's no evidence that Vivaldi was juggling, but there is a connection to our endeavor. To be worked on, a juggling pattern has to be sufficiently novel that it is interesting and engaging for the participants, but also sufficiently regular that it can be mastered with reasonable effort. The fact that the Pattern Book has grown is testament to the fact that jugglers regularly pass clubs in Madison; for this activity to persist there must be invention of new things; and as well there must be consistent elements -- count signatures or motion elements -- that we master and then recombine in interesting and enjoyable ways.

## **Internet Passing Resources**

The world of juggling has many contributors and contributions that we have failed to identify in this collection. Some important ones we know about are:

* [Flying Karamozov Brothers](http://www.fkb.com/)
* [Gandini Juggling Project](http://www.gandinijuggling.com/)
* [Martin Frost's Youtube channel](https://www.youtube.com/user/elgra2)
* [JiBe's passingDB site](https://www.passingdb.com/)
* [International Juggling Association site](http://www.juggle.org)
* [Will Murray's site](http://www.csulb.edu/~wmurray/)
* [Mark Weston's passing collection](<http://www.varietyartsdirectory.com/resources/PassingPatternsAug06.pdf>)
* ANY MORE CURRENT? Yes!
* See also,[https://jugglingfan.org/pmwiki/](https://jugglingfan.org/pmwiki/pmwiki.php?n=Patterns.RyansFeed)

# 

# **Three Person Patterns**

Big patterns come from little patterns, so we start small! Arrangements for three stationary jugglers are limited, with the most popular arrangement being the *feed* (one feeder **A** exchanges with two feedees **B, C**). Polls indicate that triangles and lines are fun but less popular! Exchanges happen between any pair of jugglers in triangles, and lines – well lines usually require some brave person in the middle who doesn’t mind risking injury from an errant pass! Even without any moving among positions, there’s an impressive variety of feeds, triangles, and lines to delight any juggling trio. We provide details of some of our favorites below.

| Feed | Triangle | Line |
| --- | --- | --- |

* Edges in each graph indicate possible exchanges between the jugglers.

## **Stationary Three Person Patterns**

| **Basic Feed** The feed for 3 jugglers is the simplest 3 person pattern and maybe the first one you try. | | | | |
| --- | --- | --- | --- | --- |
| Feeder **A** passes alternatively to feedees **B** and **C** on some prespecified base count. The most common base is 2-count rights, so feedees are then doing 4-count. Popular variations include left-handed, 3/2-count base (feedees in 3-count), or more elaborate ones with feeder in 1-count passing once, twice (chocolate bar), or three times (Tom’s) to each feedee. | | | | |
|  | **Beat, base count** | | | **Metrics:** J=3, CJ=3, OJ=4/3, cycle length=2, pH=1, PBJ=⅓ [2-count base] and ⅔ [1-count base], R=2, spin=.  The feed is a great building block for all kinds of other patterns. |
| **Juggler** | **1** | **2** |
| **A** | **B** | **C** |
| **B** | **A** |  |
| **C** |  | **A** |

Here’s a variation that’s been popular in Madison since Version 3.0.

| **Ryan's Feed**  ?by Chuck? | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat, both hands counting (i.e. 1-count base)** | | | | | | | |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| **A** | **B** |  | **C** |  | **B** | **C** | **C** | **B** |
| **B** | **A** |  |  |  | **A** |  |  | **A** |
| **C** |  |  | **A** |  |  | **A** | **A** |  |
| Think 1-5-8 and 3-6-7 for the two feedees. One variation is to swap **B** and **C.** Change side and turbo variants [see ahead]  **Metrics:** J=3, CJ=3, OJ=4/3, cycle length=8 on 1-count, pH=1, PBJ=½, R=2, spin=  See also,<https://jugglingfan.org/pmwiki/pmwiki.php?n=Patterns.RyansFeed> | | | | | | | | | |

### 

| **Rotating Feed (i.e. Feast for 3)** Everyone feeds everyone else! | | | | | |
| --- | --- | --- | --- | --- | --- |
|  | **Beat,**  **right hand counting** | | | | This feast is clockwise from above. 2-count is the standard base, but 4-count is pleasant and 3-count is nicely balanced. Try going counter-clockwise! |
| **Juggler** | **1** | **2** | **3** |
| **A** | **B** |  | **C** |
| **B** | **A** | **C** |  |
| **C** |  | **B** | **A** |
| **Metrics:** J=3, CJ=3, OJ=2, pH=1, cycle-length=2 (on 2-count), PBJ=⅓, R=1, spin= | | | | | |

### 

| **Basic Triangle** 3-count base is the default pattern for 3 jugglers in Madison! | | | | |
| --- | --- | --- | --- | --- |
|  | **Beat,**  **Any odd count** | | | As is, this is a pleasant insides triangle, which helps with passing/receiving from different people. Outsides triangles are harder on your peripheral vision, but they would emerge if you swap R and L. Staying on an event count just selects one column. |
| **Juggler** | **1 (R)** | **2 (L)** |
| **A** | **C** | **B** |
| **B** | **A** | **C** |
| **C** | **B** | **A** |
| **Metrics**: J=3, CJ=3, OJ=2, pH=1, cycle=2 on odd count (e.g. 3), PBJ=1/3, R=1, spin= | | | | |

### 

### 

### **Pulsar [MAYBE TIME TO RETIRE…DOES THIS WORK??]**

| \*\*Juggler/beat\*\* | \*\*1\*\* | \*\*2\*\* | \*\*3\*\* | \*\*4\*\* | \*\*5\*\* | \*\*6\*\* | \*\*7\*\* | \*\*8\*\* | \*\*9\*\* | \*\*10\*\* | \*\*11\*\* | \*\*12\*\* |

|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|

| \*\*A\*\* | B | C | | C | | B | C | B | C | | B | |

| \*\*B\*\* | A | | C | | C | A | | A | | C | A | C |

| \*\*C\*\* | | A | B | A | B | | A | | A | B | | B |

> \* Right hand counting

> \* Rules:

> \* Jugglers take turns as feeders: A is first, then C, then B (repeat).

> \* Each feeder feeds the other 2 jugglers.

> \* The next feeder feeds in the opposite order of the previous feeder.

A starts as the feeder and feeds right-left. C is the next feeder and feeds opposite of A, so C feeds left-right. B, the next feeder, feeds opposite of C, namely, right-left. A then feeds left-right, followed by C with right-left, and B finishes the pattern with left-right.

I recommend that feeders call out what they are doing (right-left or left-right) so that the next feeder will know what to do. This will also help every juggler know what is going on.

With the rules and the recommendation, you won't have to memorize all of the passes in the stinking table.

Try this with 1-count, so that both hands pass when you are the feeder.

Pulsar dates to 1993 by Steve Otteson and MAJ.

| **Puzzle Feeder** | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat, both hands counting (1-count base)** | | | | | | | | | | | |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **A** | **C** |  | **C** | **B** |  | **C** | **B** |  | **B** | **C** |  | **B** |
| **B** |  |  |  | **A** |  |  | **A** |  | **A** |  |  | **A** |
| **C** | **A** |  | **A** |  |  | **A** |  |  |  | **A** |  |  |
| **A** is the feeder on 3/2 count. **B** and **C** are doing the 2-person *Three Piece Puzzle* pattern six throws out of phase, which amounts to 4-3-2-3 count sequence. *Three-Piece Puzzle* and *Puzzle Feeder* patterns are by Jim Brennen. Steve Otteson in the mid-90’s promoted this pattern; but it’s not juggled frequently.  **Metrics**: J=3, CJ=3, OJ=4/3, pH=1, cycle length=12 on 1-count, PBJ=4/9, R=2, spin= | | | | | | | | | | | | | |

### 

| **Puzzle Feast** | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat, both hands counting (1-count base)** | | | | | | | | | | | |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **A** | **C** | **B** |  | **C** | **B** |  | **B** | **C** |  | **B** | **C** |  |
| **B** | **A** | **C** |  | **A** | **C** |  | **C** | **A** |  | **C** | **A** |  |
| **C** | **B** | **A** |  | **B** | **A** |  | **A** | **B** |  | **A** | **B** |  |
| All 3 jugglers are doing what the feeder did in *Puzzle Feeder*. Pattern by Steve Otteson.  **Metrics:** J=3, CJ=3, OJ=2, pH=1, cycle length=12 on 1-count, PBJ=⅔, R=1, spin= | | | | | | | | | | | | | |

### 

| **Mel in the Middle** | | | | | | | | A double 3-count feed with a moving juggler in the middle spinning around. With Mel as **B** (Mel is always **B)**, starting facing **A**, then it is as in table.  It’s good exercise for 3/2 count passing.  **Variations:** slow it down or don’t spin every time. |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat, 1-count base** | | | | | |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** |
| **A** | **C** | **B** |  | **C** |  |  |
| **B (Mel)** |  | **A** |  |  | **C** |  |
| **C** | **A** |  |  | **A** | **B** |  |
| **Metrics:** J=3, CJ=3, OJ=2, pH=1, PBJ=4/9, cycle=6 on 1 count, R=2, spin= | | | | | | | | |

#### 

### 

| **Peter’s Backcrosses** | | | | Fun with backcrosses. |
| --- | --- | --- | --- | --- |
|  |  | **Beat,**  **3-count base** | | All jugglers are in 3-count (or a slower odd count, like 5 count). **A**’s rights have to be lofty over **B**’s selfs: ditto for **C**’s lefts. **A’**s lefts (likewise **C**’s rights) go behind Peter, who is facing down [relative to layout shown]  **Variation:** 1-count, only a dream! |
| **Juggler** | **1 (R)** | **2 (L)** |
| **A** | **B** | **C** |
| **B (Peter)** | **C** | **A** |
| **C** | **A** | **B** |
| **Metrics:** J=3, CJ=3, OJ=2, pH=1, cycle length=2 on 3-count base, PBJ=⅓. Difficulty is in the backcrosses and in the precision needed by **A** and **C**, R=1, spin=0. | | | | |

### 

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### 

### **Siteswap Feeds**

It’s a can of many worms, but here are a couple!

|  | **Beat,**  **Both hands counting** | | | |
| --- | --- | --- | --- | --- |
| **Juggler** | **1** | **2** | **3** |
| **A** | d-**B** | d-**C** | **1** (zap**)** |
| **B** |  | **A** |  |
| **C** |  |  | **A** |

### 

* Right hand starts
* **A** does 441 (i.e. double pass, double pass, shuffle=zap)
* Variations: **A** can throw cross double passes and **B** and **C** can throw cross passes too (starting on opposite hands).

| \*\*Juggler/beat\*\* | \*\*1\*\* | \*\*2\*\* | \*\*3\*\* |

|-------------|-------|-------|-------|

| \*\*A\*\* | T-C | B | 1 |

| \*\*B\*\* | | A | |

| \*\*C\*\* | | | A |

> \* Both hands counting, right hand starts

> \* A does 5px3px1 (i.e. triple pass, single pass, shuffle)

Alternatively, A can throw straight passes and B and C can throw cross passes (starting on opposite hands).

\*\*Q: Luke, is this correct?\*\*

### **Hovey's Nightmares ?**

## **Extra Clubs Stationary Three Person Patterns**

The most popular extra-club feed in Madison has been the 10 club right-handed two-count feed in doubles. The only tip is for the feedee on the feeder’s right (**B**) to send slightly loopy doubles in order to avoid collisions with the feeders pass to the feedee (**C**) on their left. Adding clubs without modifying the structure requires throwing higher, faster, and with more spins!

The likes of Peter, Nick, and Steve can routinely juggle more elaborate extra club variations, such as the following. There are 4-count feeds in triples and popcorn feeds in 5-count, 6-count and 7-count. And 7 club double 3-count feeds in pass, pass, pause. And extra club chocolate bar feeds. Here are some more.

### **4 Count Popcorn Feed**

|  |  | **Beat,**  **right hand counting** | |
| --- | --- | --- | --- |
| **Juggler** | **1** | **2** |
| **A** | **C** | **B** |
| **B** | **A** | t-self |
| **C** | t-self | **A** |

* B starts with 4
* t-self means triple to self

### **6 Count Popcorn Feed**

|  |  | **Beat,**  **right hand counting** | | |
| --- | --- | --- | --- | --- |
| **Juggler** | **1** | **2** | **3** |
| **A** | **C** | t-self | **B** |
| **B** | **A** |  | t-self |
| **C** | t-self | **A** |  |

* **B** starts with 4
* This variation makes a nice triangle too.
* **Variations:** you can replace any triple self, self, single pass with a triple pass, single self to make things more interesting, or with double straight self, double straight self, pass (533p, 5p33, 443p, 44px3 all work).

### **5 Count Popcorn Feed** (one variation)

|  |  | **Beat,**  **both hands counting** | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| **Juggler** | **1** | **2** | **3** | **4** | **5** |
| **A** | d**-B** |  | d**-C** |  |  |
| **B** |  | t-self |  | d-**A** |  |
| **C** |  | d**-A** |  |  | t-self |

* **A** and **C** start with 4
* The timing is a bit wonky, **B** and **C** should delay slightly at the start.
* 4.5p:B 3 4.5p:C 3 3 | 3 5 3 4.5p:A 3 | 3 4.5p:A 3 5 3

### **Why Not + 5 count**

\*\*add the variation where feeder is doing WHY NOT\*\*

### **Extra clubs chocolate bar feed** (one variation)

|  |  | **Beat,**  **both hands counting** | | | |
| --- | --- | --- | --- | --- | --- |
| **Juggler** | **1** | **2** | **3** | **4** |
| **A** | dx**-B** | dx-**B** | dx**-C** | dx**-C** |
| **B** | **A** | **A** | d-self | d-self |
| **C** | d-self | d**-**self | **A** | **A** |

### 

### 

### 

* **A** and **C** start with 4 clubs
* **A** throws all crossing doubles (dx)
* **B** and **C** throw chocolate bar, then double self, double self
* The double selves are straight

Other feeds: Fast/Slow Feeds, Gorilla Feeds, Site-Swap Feeds...we’ve tried them all in Madison, but they haven’t made it of the Pattern Book!

### **Extra Club Rotating Feed (for 3 jugglers)**

|  |  | **Beat, both hands counting** | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** |
| **A** | d-**B** |  | d-**C** |  | d-**C** |  | d-**A** | pause |  |
| **B** |  | d-**A** |  | d-**B** | pause |  | d-**C** |  | d-**C** |
| **C** | d-**C** | pause |  | d-**A** |  | d-**B** |  | d-**B** |  |

* Both hands counting, right hand starts for **A** and **C**
* **B** starts with left hand; notice each juggler does a double self at some point
* **Variations:** Once you're comfortable with this pattern, try pirouetting under the double self, or instead of throwing the double self, do two single selves and an early triple straight pass instead (followed by a pause), or both! Pattern by Luke Emery, 1999.

There are a lot of nice extra-club triangle variations. Here are a few examples to play with.

### **10 Club 3 Count Triangle**

|  |  | **Beat, both hands counting** | | |
| --- | --- | --- | --- | --- |
| **Juggler** | **1** | **2** | **3** |
| **A** | dx-**C** |  |  |
| **B** |  |  | dx-**A** |
| **C** |  | dx-**B** |  |

* Jugglers start in sync with right hands; **A has 4**
* All passes double spin crossing passes

If that isn't challenging enough. Add more clubs and passes. **A** and **C** start with 4.

### **11 Club 2 of 3 Count Triangle**

|  |  | **Beat, both hands counting** | | |
| --- | --- | --- | --- | --- |
| **Juggler** | **1** | **2** | **3** |
| **A** | dx-**C** | dx-**C** |  |
| **B** | dx**-A** |  | dx-**A** |
| **C** |  | dx-**B** | dx**-B** |

* Jugglers start in sync with right hands; **A, B have 4**
* All passes double spin crossing passes\*\*CONFIRM WITH LUKE…\*\*

### **12 Club 1-Count Triangle**

|  |  | **Beat, both hands counting** | |
| --- | --- | --- | --- |
| **Juggler** | **1(R)** | **2(L)** |
| **A** | dx-**C** | dx-**C** |
| **B** | dx**-A** | dx-**A** |
| **C** | dx-**B** | dx-**B** |

**\***A-level pattern!

The 10 club version has been around for some time. We learned it from some fellow club passers at a convention, but I don't remember from whom. 11 Club and 12 Club variations are by Luke Emery, 2005, although it seems likely that other jugglers have also tried them.

There are corresponding extensions to a 5 person star in the chapter on 5 Person Patterns.

### **10 Club Triangle with Triple-Single-Single**

|  |  | **Right hand counting** | | |
| --- | --- | --- | --- | --- |
| **Juggler** | **1** | **2** | **3** |
| **A** | t-**C** | **B** | **C** |
| **B** | **C** | **A** | t-**A** |
| **C** | **B** | t-**B** | **A** |

* **A** starts with 4
* You can skip all the single passes until the triple passes are reliable.

### **6-Count Popcorn Triangle**

|  |  | **Right hand counting** | | |
| --- | --- | --- | --- | --- |
| **Juggler** | **1** | **2** | **3** |
| **A** | **C** |  | t**-self** |
| **B** |  | t**-self** | **A** |
| **C** | t**-self** | **B** |  |

* **A** starts with 4
* You can skip all the single passes until the triple passes are reliable.

### **5-Count Popcorn Triangle**

|  |  | **Both hands counting** | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| **Juggler** | **1** | **2** | **3** | **4** | **5** |
| **A** | **C** |  |  | t**-self** |  |
| **B** |  |  | t**-self** |  | **A** |
| **C** | t**-self** |  | **B** |  |  |

* **A** starts with 4 and right throw
* **C** starts with left
* **B** starts with right
* All passes are crossing and alternate hands
* Timing is wonky (hands really aren't all synced up, so the table is a little misleading!!)
* **C** should wait a bit before the first triple, throw high lofty single crossing passes): 3.3px3 3 5 3.
* Another 5-Count triangle is to throw crossing triples to the left in 5-count. This timing is also wonky 1 2/3 count or some such difference between each juggler.
* The pattern should be possible in 5-count with triple crossing passes too...Hmmm... But fast...

### **10 Club 4-Count Triangle**

This is probably the simplest extra club triangle, but jugglers are out of sync so it doesn’t fit neatly into the tabular format. The juggler with 4 clubs starts with a right hand double to the left and then repeats in 4-count. Each juggler passes a right handed double to the left as the incoming double pass approaches. The timing on this pattern is not symmetric. Each juggler is 1/3 beat out of time with the juggler before. This pattern can be extended to a number of interesting variations, such as the *Bubbler of David*.

#### 

?NOT SURE A AND C NOT SYMMETRIC..??

Extra club version of Mel in the Middle, except in 4-count instead of 3-count. Inside person whirls with half pirouettes under doubles while outsides do popcorn. All passes are right handed.

\footnotesize

| \*\*Juggler/beat\*\* | \*\*1\*\* | \*\*2\*\* | \*\*3\*\* | \*\*4\*\* | \*\*5\*\* | \*\*6\*\* | \*\*7\*\* | \*\*8\*\* | \*\*9\*\* | \*\*10\*\* | \*\*11\*\* | \*\*12\*\* | \*\*13\*\* | \*\*14\*\* |

|-------------|-------|--------|-------|-------|--------|-------|--------|-------|-------|--------|--------|--------|--------|--------|

| \*\*A\*\* | D-C | | B | | D-C | | T-self | | D-C | | D-C | | B | |

| \*\*B\*\* | | | A | | D-self | ½ P | | C | | D-self | ½ P | | A | |

| \*\*C\*\* | | T-self | | D-A | | D-A | | B | | D-A | | D-A | | T-self |

\normalsize

> \* Both hands counting

> \* A starts with 4 clubs, right hand

> \* B starts facing A, right hand

> \* C starts with left hand

> \* ½ P marks half pirouette underneath the double

> \* 1 is the same as 11. This is just one possible variation of spinning underneath popcorn.

### **Swiftly Tilting Popcorn**

\*\*CHECKING TO MATCH ABOVE BUt OUt OF SYNC

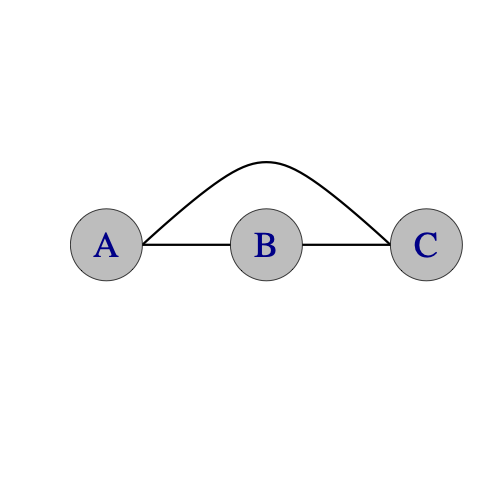
|  |  | **Beat, both hands counting** | | | | | |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** |  |  |
| **A** | **C** | **B** |  | **C** |  |  |  |  |
| **B (Mel)** |  | **A** |  |  | **C** |  |  |  |
| **C** | **A** |  |  | **A** | **B** |  |  |  |

#### 

* **A** starts with 4 clubs, and right hand
* B starts facing A, and right hand
* C starts with left hand
* ½ P marks the half pirouette underneath the double
* 1 is the same as 11??

### 

### **Line Variations**



* **Dropback Line: A** passes to **B**. **B** drops back to **C**. **C** passes to **A**. You can do a dropback line in any count: 2-count, 4-count, 3-count, chocolate bar. It's a nice pattern to add clubs to as well. Try one two, or 3 extra clubs with doubles or one extra club in 3-count (**A** and **B** cross, **C** throws straight).
* **Line Feeds:** You can do any of the feed variations in a line layout instead of a V. Some will be useful for more complex patterns. Also see 4 person Lines.

### 

| **An Extra Club Line** | | | | | |
| --- | --- | --- | --- | --- | --- |
|  |  | **Beat, both hands counting** | | | |
| **Juggler** | **1** | **2** | **3** | **4** |
| **A** | d-**C** |  | **B** |  |
| **B** |  |  | **A** |  |
| **C** |  | t**-self** |  | d-**A** |

#### 

## 

## 

* **A** starts with 4 clubs; **B** faces **A**
* **A** alternates right hand doubles to **C** and singles to **B**. **B** does right hand 4-count to **A**. **C** alternates right triple selves and doubles to **A** (fast popcorn)
* What do you do if there are 3 club passers and one is more advanced, one is intermediate and the third is a beginner. This is a nice pattern to accommodate everyone!

## 

### **Up-Up-Over**

Here's a curious pattern that exercises your 4-club columns skill. Jugglers **A** and **B** start with 4 clubs each. Juggler **C** starts with 2 clubs. The vertical arrow in the table means **up**, i.e., throw two clubs up as double selves. Feeder **A** is doing a slow two-hand doubles feed, starting with **C**. Juggler **B** starts in sync with **A** and does **up-up-over**. Juggler **C** waits to receive the two incoming from **A** and then responds with **up-up-over.**.

| **Up Up Over** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat (synced hands)** | | | | | |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** |
| **A** | **C** |  |  | **B** |  |  |
| **B** | **↑** |  | **A** |  | **↑** |  |
| **C** |  | **↑** |  | **↑** |  | **A** |

* Simultaneous double throws (all jugglers)
* **A** and **B** both start with 4
* **C** starts with 2
* Vertical arrow indicates synced double self

Prof Mike and Steve Otteson did this first in the early 90's, when Madfest was still in the Memorial Union. See an animation of (a variation of!!) this pattern at [Juggloid](*http://juggloid.com/editor/?s=yhIKp1*)

## **Moving Three Person Patterns**

Now for some moving patterns.

-change side feeds \*\*discuss this is the first moving pattern, but we don’t describe it super carefully\*\*

### **Change-sides feeds**

### **Turbo**

After you’ve mastered change-side feeds, you’re ready for the *Turbo*, one of the Madison favorites. A *Turbo* is a group of 3 weaving jugglers who feed themselves. It is also a *Two-leaf Clove*r or a continuous change-sides feed through the middle. In the standard version, you pass every right hand throw when you are feeding, and every other when you are moving.

| **Turbo** | | | | |  | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat, base count (2-count rights is standard; ½ cycle shown)** | | | | | | | | |
|  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** |
| **A** | **C** | **B** |  | **B** |  | **C** |  | **C** | **B** |
| **B** |  | **A** | **C** | **A** | **C** |  | **C** |  | **A** |
| **C** | **A** |  | **B** |  | **B** | **A** | **B** | **A** |  |
| The standard *Turbo* is performed right-handed on a 2-count base (Peter’s start is shown, which has the first recipient feedee, **C**, becoming the first mover!) It's 18 right-hand beats for a full cycle; 9 beats to repeat the passing sequence, but flipped in orientation. When a juggler moves to the other side, he or she cuts across in front of the old feeder, and turns around to pass to the new feeder. We’ve tried many variations but often return to the standard!   * **Left-handed** – Same as standard, but mirror image. * **3-count** – Feeder does 3 count, feedees do 6 count. * **Chocolate bar** – Fun! (pass-pass-self-self replaces pass-self) * **Double 3 count** – Tricky. There are 2 different ways to do the transitions. Usually we have the movers stay in 3-count and move on the inside hand throw. You can also do this pattern where the movers transition in 4 count and move on the outside hand throw. Feels a little like the *El Nino*. * **Tom's Turbo** – Feeder is in 1-count and does 3 passes in a row to each feeder. Have each juggler start with a different set of clubs. (Created by Tom Pomraning.) * **10-Club Turbo** – See below. * Also see *Interlocking Turbos* in 6-person patterns and *Strange Attractor* in 5-person patterns. * **Timing variations:** Recent innovations, like pass only on beats 1-3 on a 5-count cycle or 1-4 on a 7 count cycle   *Jazzing it up:* When changing sides the mover has the option of clockwise or counter-clockwise turns. Try both. One is harder and cooler. The standard (inside) turn is usually easier for right-handers off the right side of the feed and harder for right-handers off the left side. Try double or triple earlies before entering the middle. Try a behind-the-back pass when moving off the right side. For a cool animation (thanks Nick), see  [https://www.passingdb.com/patterns.php?id=49 2](https://www.passingdb.com/patterns.php?id=49%202%20http://juggloid.com/editor/?s=npRW7l) <http://juggloid.com/editor/?s=npRW7l>  **Metrics**: J=3, CJ=3, OJ=2, pH=1, PBJ=⅓ (standard). On full cycle of 18 base beats, motion=8 JU, spin=4. | | | | | | | | | | |

*History:* We’re not sure. *Turbo* may have developed inadvertently when in the early 90’s we tried, unsuccessfully, to recreate *Bruno’s Nightmare* from faulty memory. The main difference between *Bruno’s Nightmare* and *Turbo* is when you turn. In *Turbo* you turn before entering the middle. In *Bruno’s Nightmare* you turn after exiting the middle, which lengthens the cycle and makes the pattern easier by some measures. There are also variations of *Bruno’s Nightmare* that we’ve heard about but the MAJ doesn’t juggle much!

### **Bruno's nightmare**

We haven't juggled this much in Madison, but we mention it for reference. It used to be popular in Europe! See

[PassingDB](<https://www.passingdb.com/patterns.php?id=49>)

| **2/3** | |  | | | |
| --- | --- | --- | --- | --- | --- |
| Read this *two pi on three*. This one is a late bloomer, considering how simple it is and how long people have been juggling and moving in groups of three. | | **Beat, base count (½ cycle in table)** | | | |
|  |  |  | **1** | **2** | **3** |
| **A** | **B** | **C** |  |
| **B** | **A** |  | **C** |
| **C** |  | **A** | **B** |
| Three jugglers, **A**, **B**, and **C**, all move through the figure eight over the course of six beats on the base count. In contrast to a *Turbo,* there is not a feeder being swapped here; all folks are moving all the time. Relative to the figure in top right, there are six positions, and at any point jugglers occupy three alternating positions. The rule is pass and move to the next position. Any count works; 5-count is pleasant, 4-count is fun, 3-count is more fun! Recent variations alternate the count, such as 1-4 on a 7 for a 3-count/4-count alternation. In any count, it’s **pass-one, pass-the other, self (i.e. phantom)**. Whatever is the base count, the pattern has a gap where you can plug in any other juggler or pattern that matches that count (including three other jugglers doing a 2/3). Looks like two pies when viewed from above, and it’s 3 jugglers. Plus, each circle in the layout is divided into 3, hence the name. Prof Mike invented 2/3 in summer 2017, but the popular version is Mel’s variation (shown above), in which the first recipient in the pair moves through. In the original, the first recipient goes backwards and the non-recipient goes through (equivalently, start the passing sequence with **A-C**. This is a curiously different and more difficult version owing to backwards moves out of the middle..  **Metrics:** J=3, OJ=2, CJ=3, PBJ=2/(3\*base count), cycle length=6, pH=1, motion = 4 JU, spin = 4. | | | | | |

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### **Mel’s variations of 2pi/3 varies when you cross…lengthens cycle**

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| **Laxative** |  | | | |  |
| --- | --- | --- | --- | --- | --- |
| This one makes you *go go go*, hence the name. |
| **Beat**  base is 5 or 7 count | **Juggler** | | |
|
| **A** | **B** | **C** |
| **1-6** | **C** | **A** | **B** |
| **Metrics**: J=3, CJ=3, OJ=2, pH=1, PBJ=1/count, cycle length=6, motion =4 JU, spin=(10/3). | | | | |
|
| *Laxative* is a dynamic 3-person moving pattern in which everyone is synced up and passing on the same **odd count**. We usually do this on 7-count, which allows plenty of time to move; 5-count also works well; 3-count is still a dream! Because of the constant movement, the to-from passes never change. **A** always passes to **C**, who always passes to **B**, who always passes to **A**. The movement and the odd-count allows that these passes are **all** inside-triangle passes. There are 6 total passing beats, during which each juggler traverses the 6 positions, though the local cycle (wrt who moves) is three beats. Those movements entail crossing between the other two jugglers (which goes in turn **A** then **B** then **C**), and then moving along the edges of the hexagon (either twice to left or twice to the right), in order to make space for the next mover. It’s surprisingly challenging for such a simple pattern! Beginners often get confused about which way to go along the edge, or whose turn it is to move across!  Pattern by Prof Mike, sometime after 2018. Frequently juggled by Mike, **C**, Mel, **B**, and Conor or Nathan, **A** [performed at Madfest 2025] | | | | | |

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## **Extra Club Moving Three Person Patterns**

### **10 Club Turbo**

The *10 Club Turbo* has the same positions and movement as the *Turbo* but with an extra club. Usually we throw the passes as doubles (same as in 7 club 2-count). In order to keep the timing the mover must add an extra beat into the pattern. That can be done by throwing a double self (either right or left) to the opposite hand or by throwing an early triple pass and pausing for one beat. The diagram below shows the early triple, but experiment with whatever works best for you (some people think a right to left double is easier). Beats below are on the right hand of the person on the left side of the pattern (in this view; e.g. juggler **A** at the beginning); **B** and **C** could start in sync with **A** but with two clubs in the left, but we usually start them on the delay. In the table, **move** refers to the beat when the juggler initiates his/her switch of sides; to be fair, jugglers are constantly moving in this A-level pattern! Also, **pause** happens after the juggler sends his/her triple and they are waiting ½ a beat to get synced up with the opposite side, where they are headed.

| **10-club Turbo** | | | | |
| --- | --- | --- | --- | --- |
| **Jugglers** | | | | **locations** |
| **Beat** | **A** | **B** | **C** |
| **1** | d**-B** |  |  |  |
|  |  | d**-A** |  |
| **2** | d-**C** | **move** |  |  |
|  |  |  | d-**A** |
| **3** | d-**C** |  |  |  |
|  |  | t-**C** | d-**B** |
| **4** |  | **pause** |  |  |
|  |  |  | d-**A** |
| **5** | d-**C** |  |  |  |
|  | **move** |  | d-**B** |
| **6** |  | d-**C** |  |  |
|  |  |  | d-**B** |
| **7** | t-**B** | d-**A** |  |  |
|  | **pause** |  |  |
| **8** |  | d-**C** |  |  |
|  |  |  | d-**B** |
| **9** |  | d-**A** | **move** |  |
|  | d-**B** |  |  |
| **10** |  |  |  |  |
|  | d-**C** |  | t-**A** |
| **Continue…** | | | |  |

#### 

The table shows 2 transitions. Note that the old feeder (**A)** passes twice in a row to the new feeder (**C**). The mover (**B**) throws a triple to the new feeder at the SAME time as the new feeder throws a double to the mover and then pauses for one beat. The feeder and the 2 feedees are always on opposite timings (the feeder's right is synchronized with the feedees' lefts). The easiest way to learn is by practicing the change sides feed with transitions on the outside and getting comfortable with the triple or the self double timing transition. Then learn the inside transition and finally rev it up to true turbo speed. Excelsior!

By Luke Emery, 1999.

**Metrics**: J=3, CJ=10/3, OJ=2, pH=\*, cycle=\*\*(?18), motion=4, spin=4,

\*\*Even more variations:\*\*

Try with single passes instead of double passes in 7 club 2 count singles speed.

We worked out an 11-Club Turbo variation with triple selves on the transitions, but it's too hard for us to run more than a couple transitions at a time. Maybe we'll get it in a future version of the book.

### **Another 10-Club Turbo**

The pattern above will always be \*\*the\*\* 10-Club Turbo, but here is another version that makes a nice diversion. It's based on an extra club feed too, but the transitions in the middle are made by a half pirouette underneath a right to left double.

The feedee who is moving first steps into the middle of the pattern directly between the feeder and the non-moving feedee. After one pass the moving feedee does a half pirouette underneath a double right to left self throw, Then steps back to complete a single turbo transition. The table below has one complete transition.

\footnotesize

| \*\*Juggler/beat\*\* | \*\*1\*\* | \*\*2\*\* | \*\*3\*\* | \*\*4\*\* | \*\*5\*\* | \*\*6\*\* | \*\*7\*\* | \*\*8\*\* | \*\*9\*\* | \*\*10\*\* | \*\*11\*\* |

|-------------|-------|-------|-------|-------|-------|-------|-------|--------|-------|--------|--------|

| \*\*A\*\* | D-B | | D-C | | D-B | | D-C | | D-C | | |

| \*\*B\*\* | | D-A | | | | D-A | | D-self | | | D-C |

| \*\*C\*\* | | | | D-A | | | | D-A | | D-B | |

\normalsize

> \* Both hands counting

> \* A starts with R

> \* B and C start with L

> \* D-self is a half pirouette

![](./media/image3.jpeg)

When you do the half pirouette, make sure to throw the double more inside than usual and have the outside passers pass a little on the wide side to reduce collision. By Luke Emery, 2002.

### **GDP**

Luke's GDP is a sort of extra-club continuous change-sides feed. Peter, Mike and Luke like to practice it after doing the extra-club turbo; it's a fine pairing! By Luke Emery, 1999.

| **GDP:** passes and positions | | | | |
| --- | --- | --- | --- | --- |
| **Jugglers** | | | | **locations/passes** |
| **Beat** | **A** | **B** | **C** |
| **1** | t-**C** |  |  |  |
| **2** | **B** | **A** | t-**A** |  |
| **3** | t-**C** | move |  |  |
| **4** | move |  | t**-B** |  |
| **5** | **C** | t-**C** | **A** |  |
| **6** | move |  | t-**B** |  |
| **7** |  | t-**A** | move |  |
| **8** | t-**B** | C | **B** |  |
| **9,**  **then 10=1** |  | t-**A** | move |  |

* **Beat:** Right hand counting
* **Start: A** starts with 4 clubs and passes triple to **C**, then a single to **B**. **B** faces **A**, starts with a self, as if passing every others to **A**. **C** starts with a self, then triple o **A**. [Note, if three jugglers repeat beats 1 and 2 they are doing a stationary extra-club feed.]
* **Movement:** The first two beats above describe a base pattern without movement. In GDP, all three jugglers do the same sequence, but shifted in time. From **B’**s perspective: self, single to **A,** self, self (while replacing **A**), triple to **C**, self (**A** replaces **C**), triple to **A**, single to **C,** triple to **A**, self, (as **B** moves to the middle). Repeat. Be careful to keep your triples from hitting the non-recipient by pushing them toward the new mover!
* **Variations:** Doubles – Throw doubles instead of triples (this has the 7-club 4-count cadence for two). Also, a whole bunch of tricks can be done while moving into the center (such as an early triple followed by a pirouette when entering the middle). See also a variation we call *Cathedral* in the 5 Person Patterns.
* **Metrics**: J=3, CJ=10/3, OJ=2, cycle length=, pH=, \*\* motion= , spin

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### **Laura's Weave**

Peter came up with this pattern as a birthday present for Laura in 2010. Three jugglers move in a figure eight, as in a standard weave, but with no feeder. There's one extra club. On right-hand counting, it's triple self, triple pass, then four single selves as you move over to the other side. This same sequence can be done with straight-up passes in the middle of the weave. The six beats shown get us half way towards a full cycle (12 beats)

| **Laura’s Weave:** passes and positions | | | | |
| --- | --- | --- | --- | --- |
| **Jugglers** | | | | **locations/passes** |
| **Beat (**right hands**)** | **A** | **B** | **C** |
| **1** | t-**self** |  |  |  |
| **2 (start)** | t-**B** |  |  |  |
| **3** |  | t-**self** |  |  |
| **4** |  | t-**C** |  |  |
| **5** |  |  | t-**self** |  |
| **6** |  |  | t-**A** |  |

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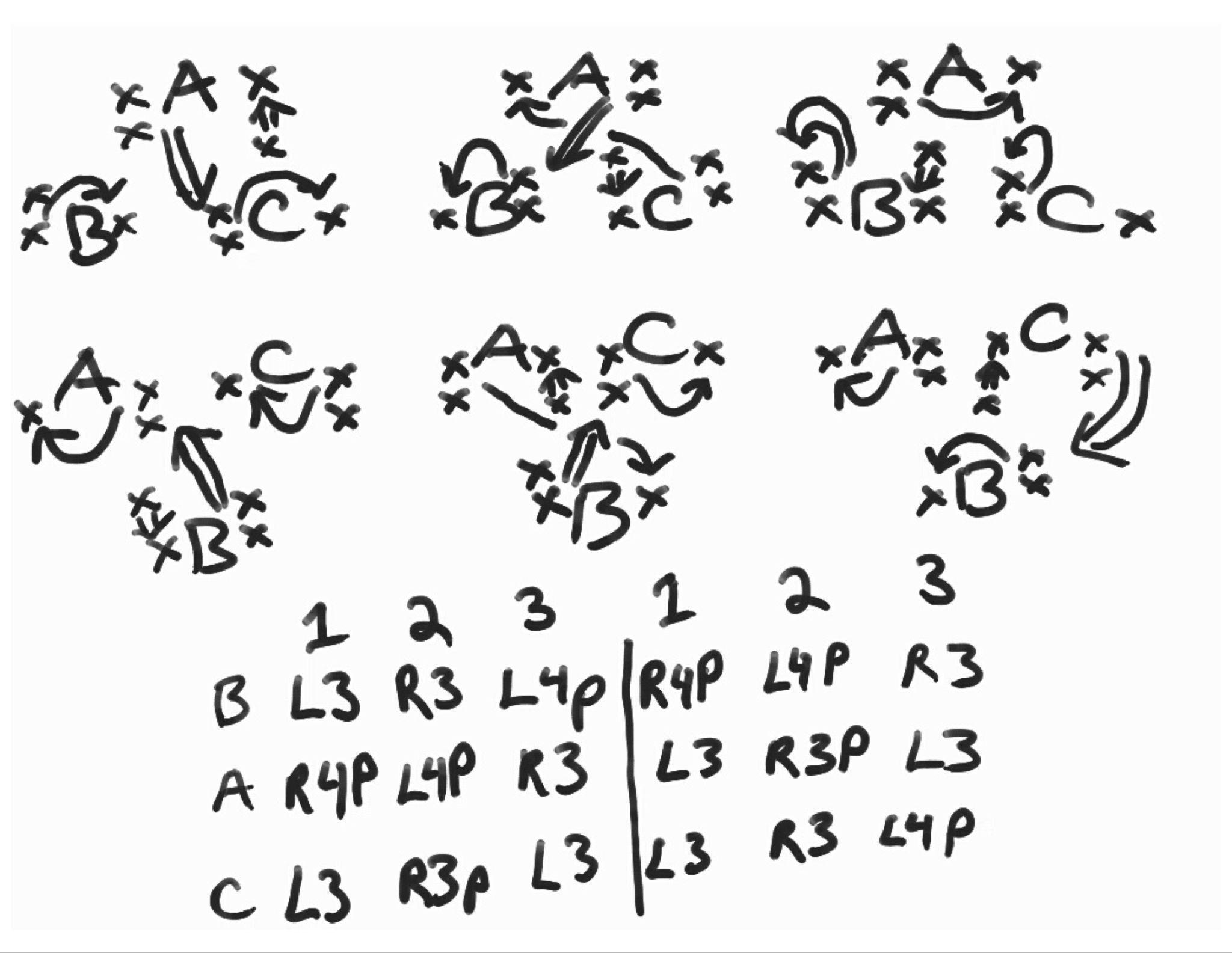
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### **Graham's 3 stuff**

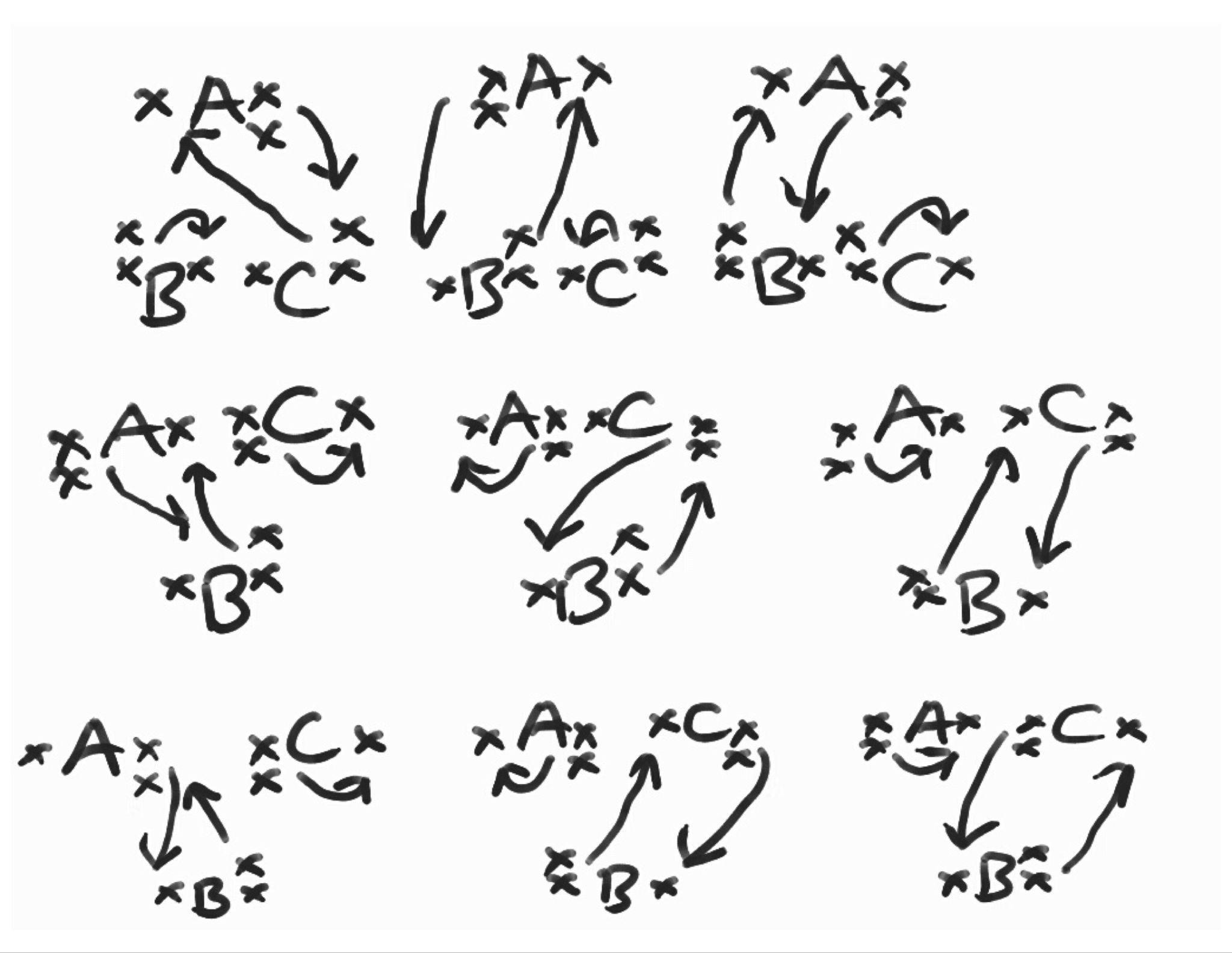
Here are some challenging patterns for 3 jugglers by Graham Paasch.

#### **Change Sides Double-3 Count Feed Plus**



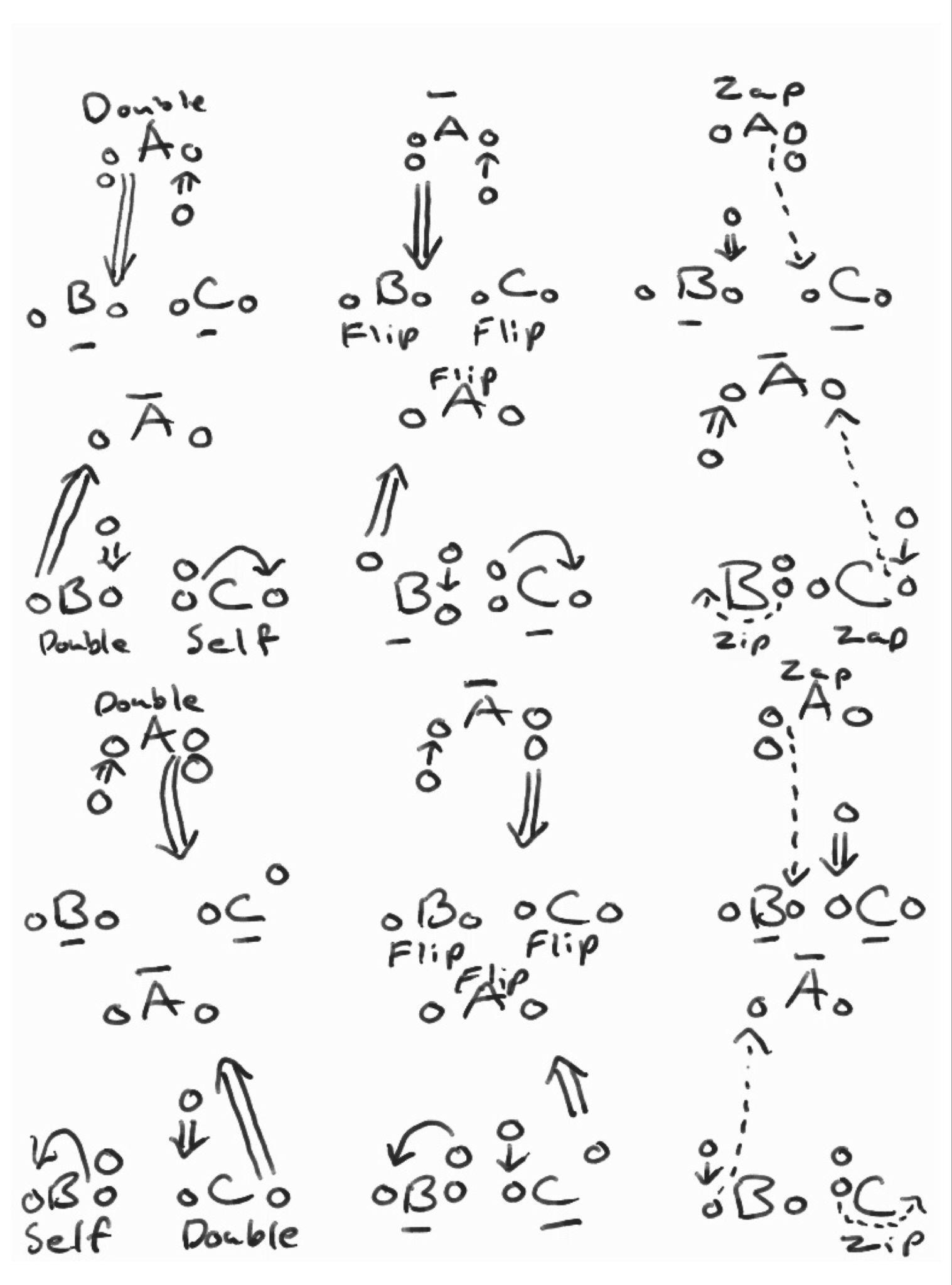
*./media/ChangeSidesDouble3FeedPlus.jpg*

#### **Change Sides RRLRLRLLRLRL**



*./media/ChangeSidesRRLRLRLLRLRL.jpg*

#### **Safe Beast of Arg**



*./media/SafeBeastofArg.jpg*

### **Change Sides Variant (Ryan’s feed)**

In this variant, the feedees take turns moving across like in the traditional change sides feed. However with each transition the pattern will be flip flopping between the original Ryan's Feed and the inverted variant. All 3 juggler's will need to pay attention to what variant they are transitioning to. As to when the feedees should make their transition, we found there are multiple times when the feedees can take turns moving across. The easiest time to transition is after the feedee does their two 1-count throws (EG, Juggler C's 6 and 7 throws in the original pattern).

### **Turbo Variant**

It is theoretically possible to turbo the change sides variant by having the feedees transition through the middle. However in practice we found it difficult; but the nice thing is the pattern doesn't invert itself after each transition like in the change sides variant.

# **Four Person Patterns**

## **Stationary Four Person Patterns**

Here are some classic arrangements for four stationary jugglers

| Box | Feed |
| --- | --- |
| 2 on 2 | Y (Oogle) |
| Locked lines | |
| Canoe | Anklet |

* Edges in each graph indicate possible exchanges between the jugglers. We sometimes call these *who-passes-to-whom* graphs (average degree is the *partners* metric), but they also encode spatial arrangements.
* Think upside down to see the Y shape among the juggler positions!
* ***\* comment on A-B pass in some Y’s [Y2K]***

### **Boxes**

#### 

| **Standard Asynchronous Box** | | | |  |
| --- | --- | --- | --- | --- |
|  | **Beat**  **(asynchronous)** | | |  |
| **Juggler** | **1** | **2** |  |
| **A** | **B** |  |  |
| **B** | **A** |  |  |
| **C** |  | **D** |
| **D** |  | **C** |  |



* A box is characterized by having jugglers face and pass to each other if they reside on opposite ends of a diagonal, such as jugglers **A** and **B** or jugglers **C** and **D**. Later we talk about box-like patterns where passes go along the perimeter, but they are less boxy!
* In the standard 2-count asynchronous box, the **A-B** are offset (i.e., are asynchronous) from the **D-C** pair [i.e. one pair is on lefts while the other is on rights]. Purists like to have **A-B** starting each with 2 in the right hand and passing, while **D-C** start with two in the left at the same time and selfing, but it’s easier for **D-C** just to watch and throw from right on queue (i.e. when **A-B** are on their first left self).
* Try left-handed!
* Any regular count slower than 1-count involves gaps, and so the pairs may be offset for a successful box; e.g. 2-count lefts, 3-count work nicely. But the gaps need to balance out; e.g., 3/2 count doesn’t work for both pairs because if **A-B** do 3/2 then there’s only 1 gap in 3 beats for **D-C** [but **D-C** can do 3-count in that case]
* The 4-count box is a great place to start, and it’s also a popular box when you have audience volunteers. You put the volunteer right in the middle and pass around on all sides! Remember when Mel dinged one of the Channel 15 news anchors in the head! (Was it Mike Mickiney?)
* *Pistons* and the *Minuet* are moving patterns derived from the asynchronous box.

#### 

| **Standard Synchronous Box** | | |  |
| --- | --- | --- | --- |
|  | **Beat** | |  |
| **Juggler** | **1** |  |
| **A** | **B** |  |
| **B** | **A** |  |
| **C** | **D** |
| **D** | **C** |  |



* Now the **A-B** pair is doing exactly the same thing as the **D-C** pair, and at the same time. The jugglers can pass on any standard timing (1-count, 2-count, 3-count are most common). Owing to the synchrony, collisions are much more likely. Synchronous boxes are great for working on your timing!
* Wide throws make collisions less likely.
* A good technique to regulate the timing is to focus on the pass release by the person to your right (at least at right-handed throw beats). Your release should be synced with theirs, and then your club will pass just **behind** their club, owing to the configuration.

#### **Extra Club Boxes**

* **14 club box (standard):**  A classic pattern for four. *Set up is basically like the Standard Asynchronous Box*, but jugglers **A** and **D** start each with 4 clubs. To find the best gaps and avoid collisions, each juggler keeps an eye on the juggler to their right (in the right-handed version!), and releases their double straight pass just after that next-spot juggler so that the clubs cross passing lines in an orderly fashion. With the right-handed version, **A** starts and passes a double to **B;** then at about a ¼ beat**, D** passes a double to **C;** by then **B** is ready to respond to **A** while also being behind **C,** so **B** passes next back to **A;** finally **B** chases **C** and passes back to **A** to complete the cycle**.** Simply, chase the person on your right. Collisions happen when someone misses a gap, so make sure you keep an eye on each release on the right side (rather than on the mess of clubs in the middle). Timing can get screwed up too if one pair juggles higher than another, but when it works it’s a beautiful pattern. The Mad-5 did a version where after 10 rights, one of each pair would collect all 7 clubs, and spin to show the collected clubs for a rousing applause!
* **14 club box (4-count):**  The 4-count means it’s *easy;*  there are big gaps for each pair to use (more juggling with oneself, and less opportunity for exciting collisions!). But the timing and extra clubs make this challenging; usually it’s done with triples, but doubles are possible for passers with better hand speed! The two pairs are 1 beat away from each other (**A** and **B**'s rights are synchronized with **C** and **D**'s lefts).
* **16 club box (standard):**  A thing of beauty! There are variations for the talented numbers jugglers, but the one we like is set up like the *14 club box*, but with **A** and **D** doing triples and **C** and **B** responding with singles. Nice steady triples are key; chasing your neighbor on the right is the same rule as before, but it’s harder to keep triples steady. All jugglers tend to stare at the triples, and it’s easy for the single passers (**B** and **C**) to over charge their singles. Triplers start, with **D** chasing **A**; singlers should wait as long as possible to release on the start.
* **Really hard boxes!** You can also do a 16 club box pattern with all the jugglers synchronized in 8 club 2-count singles, doubles or triples. Nice! Pass either straight across, or to the juggler on the left. With 9 club triples 2 count and each juggler offset ½ beat, you get an 18-club box! If the timing is perfect, it is possible to do a 14 club box in 1-count, with right hand doubles across the box and left hand singles along the edges of the box (BUT THEN YOU PASS TO TWO PEOPLE, SO NOT WE DESCRIBE LATER)

### **Less Boxy Boxes**

In these patterns jugglers set up like in a box, but passes include those along the perimeter as well as across the diagonal.

#### 

| **Rotating feed (for 4 )** An ancient pattern | | | | |  | Though easier to juggle than related patterns like the *Feast* (below), this one requires a bit more attention to keep track of who is feeding, which makes it a bit more error prone! |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Juggler** | | | |
| **Beat** | **A** | **B** | **C** | **D** |
| **1** | **D** |  |  | **A** | Juggler **A** starts the feed, sending passes from their left to right (clockwise from above), with the pass to the final feedee converting that juggler into the new feeder. The feeder position quietly circulates counter clockwise, even though each feeder is sending passes clockwise. Rotating feed (both directions work; left-right from feeders perspective is shown)  Beat is preferred count (often a right-hand 2-count base)  **Metrics**: J=4, OJ=3, pH=1, CJ=3, cycle=8 on base count, PBJ=¼ on 2-count base. | |
| **2** | **B** | **A** |  |  |
| **3** | **C** |  | **A** |  |
| **4** |  |  | **D** | **C** |
| **5** |  | **C** | **B** |  |
| **6** | **B** | **A** |  |  |
| **7** |  | **D** |  | **B** |
| **8** |  |  | **D** | **C** |

#### 

| **Feast (for 4)** Everyone feeds everyone else! | | | | | |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Beat (base)** | | | | Any agreeable count works. 4 count is nice for rookies, but 3-count is more popular in Madison. |
| **Juggler** | **1** | **2** | **3** | **4** |
| **A** | **D** | **B** | **C** |  |
| **B** | **C** | **A** | **D** |  | This version is clockwise (from above); counterclockwise works too. For beginners, the *Feast* is a notch harder than the asynchronous box because you have to swivel through 90 degrees during each cycle. | | |
| **C** | **B** |  | **A** | **D** |
| **D** | **A** |  | **B** | **C** |
| **Metrics:** J=4, CJ=3, OJ=3, pH=1, cycle=4 on base count, PBJ=3/(4\*base), e.g., ¼ on 3-count. **Picnic** *Picnic* is a nice 3-count variation where **A** and **C** start passing crosses (right-right or left-left) and **B** and **D** start with straight passes. When you complete your cycle and restart after your self beat, you switch from whatever you were doing (e.g. crosses then straights, or straights then crosses). | | | | | | | |

#### 

| **Bermuda Quadrangle** Tricky angles! | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat, 1-count base** | | | | Jugglers start with rights.  Pattern by Laura and Becky Provance, Barry Friedman, and Steve Otteson.  **Metrics**: J=4, OJ=3, CJ=3, pH=1, cycle=4, PBJ=¾. |
| **Juggler** | **1** | **2** | **3** | **4** |
| **A** | **B** | **C** | **D** |  |
| **B** | **C** |  | **A** | **D** |
| **C** | **A** | **D** |  | **B** |
| **D** |  | **A** | **B** | **C** |



#### 

| **Maya** | | | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat (both hands counting)** | | | | | |  |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** |  |
| **A** | **D** |  | **B** | **C** |  | **B** |  |
| **B** | **C** |  | **A** | **D** |  | **A** |  |
| **C** | **B** | **D** |  | **A** | **D** |  |
| **D** | **A** | **C** |  | **B** | **C** |  |  |
| * 12 clubs * Jugglers start with 2 clubs in the right hand. * This pattern by Tom Pomraning (`Coach`) was published in *Jugglers World* **[\*\*date\*\*].** Tom was an incredible chocolatier and juggler! | | | | | | | |  |

#### 

| **Interlocking Triangles** | | | |  |
| --- | --- | --- | --- | --- |
|  |  | **Beat (right hand counting)** | |  |
| **Juggler** | **1** | **2** |  |
| **A** | **B** | **B** |  |
| **B** | **D** | **C** |  |
| **C** |  | **A** |
| **D** | **A** |  |  |

#### 

#### **Rush and Rest**

| **Classic** | | | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat (both hands counting)** | | | | | |  |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** |  |
| **A** | **B** | **C** | **B** |  | **D** |  |  |
| **B** | **A** | **D** | **A** |  | **C** |  |  |
| **C** |  | **A** |  | **D** | **B** | **D** |
| **D** |  | **B** |  | **C** | **A** | **C** |  |
| **1st Variation (feast like)** | | | | | | | |  |
|  |  | **1** | **2** | **3** | **4** | **5** | **6** |  |
| **A** | **B** | **B** | **C** |  |  | **D** |  |
| **B** | **A** | **A** | **D** |  |  | **C** |  |
| **C** |  |  | **A** | **D** | **D** | **B** |  |
| **D** |  |  | **B** | **C** | **C** | **A** |  |
| **2nd Variation** | | | | | | | |  |
|  | **A** | **D** | **D** | **B** |  | **C** |  |  |
| **B** | **C** | **C** | **A** |  | **D** |  |  |
| **C** | **B** | **B** |  | **D** | **A** |  |  |
| **D** | **A** | **A** |  | **C** | **B** |  |  |
| * 12 clubs * The *Rush and Rest* patterns are box-like with everyone doing 4 of 6 passing beats, with a 1-count section followed by an easier section * Patterns by Steve Otteson and MAJ from 1998. * Since Steve left Madison we don’t often juggle these! * ***Hovie’s nightmares ought to be near here*** | | | | | | | |  |

### 

### **Extra club less boxy boxes!**

| **Spider Web** | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat (both hands counting)** | | | |  |
| **Juggler** | **1** | **2** | **3** | **4** |  |
| **A** | t-**C** |  | d-**B** |  |  |
| **B** |  | t-**D** |  | d-**C** |  |
| **C** | d-**D** |  | t-**A** |  |
| **D** |  | d-**A** |  | t-**B** |  |
| * 15 clubs (3 extra) * Both hands counting, passes with rights * **A** and **C** start with right; **B** and **D** start with left * **A**, **B**, and **C** start with 4 clubs * **Check with Luke on origin and start for B; is this coded correctly? Seems like triples should cross and doubles should go right…** | | | | | |  |

#### 

|

And

more [include Luke’s 14-club 1-count box from V3.0 \*\*\*\*CHECK WITH LUKE on Version 3.0 book entry\*

Throw a little wide on the double passes and make sure that everyone has

metronome perfect timing and it actually works! Pattern by Luke Emery, 2007. \*\*Q. Luke. C is not on A's left; should C-D swap?\*\*

#### 

| **Extra club rotating feed (for 4 jugglers)** | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Juggler** | | | |  |
| **Beat** | **A** | **B** | **C** | **D** |  |
| **1** | **D** | d-**self** |  |  |  |
| **2** |  | **pause** | **A** | **d-self** |  |
| **3** | **B** |  |  | **pause** |
| **4** |  | **D** | d-**self** |  |  |
|  | **5** | d-**self** |  | **pause** | **B** |  |
| **6** | **pause** | **C** |  |  |  |
| **7** |  |  | **A** | **d-self** |  |
| **8** | **C** | d-**self** |  | **pause** |  |
| **9** |  | **pause** | **D** |  |  |
| **10** | d-**self** |  |  | **B** |  |
| **11** | **pause** | **D** | d-**self** |  |  |
| **12** |  |  | **pause** | **A** |  |
| * 1 extra club rotating feed (both directions work) * Beat in table is both hands counting * All throws are right hand doubles (unless you do the opposite version with all throws being lefts) * **A** starts with 4 clubs * **A** and **B** start with right hand * **C** and **D** start with left hand * The steady state right hand sequence is pass across, pass left, self, pass across, self. * Ri**ght-hand selves are all double selves[Luke please check this.]** * Pattern by Luke Emery, 1999. | | | | | |  |

| **Gustav \*\*LUKE, PLEASE CHECK\*\*** | | | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat (both hands counting)** | | | | | |  |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** |  |
| **A** | t-**D** |  | C | **t-D** |  | **C** |  |
| **B** | **D** |  | **D** |  |  |  |  |
| **C** |  |  | **A** |  | **A** |  |
| **D** | **B** | t-**A** |  | **B** | t-**A** |  |  |
| * This is a double 3 count extra club3 extra clubs?check * Both hands counting * **A** starts with 4 clubs, and throws triple crosses * **B** throws triple straights * **C** and **D** start slightly after **A** and **B** – timing is a bit wonky \*\*Are they doing singles or triples?\*\* * Pattern by Luke Emery, 2008, and named after the hurricane | | | | | | | | |

#### 

| **Two on Two Double Three Count** | | | | | Let’s start eliminating those self throws! |
| --- | --- | --- | --- | --- | --- |
|  | **Beat, 1-count base** | | | | Right hand starts is standard. All jugglers do 3/2 count.  This is the left-to-right feed version, but right-to-left works too. It’s is a prerequisite for *El Nino* or *La Nina, Martin’s Madness,* and lots more.  Dates to July 1997 in MAJ, but maybe earlier by others |
| **Juggler** | **1** | **2** | **3** |
| **A** | **C** |  | **D** |
| **B** | **D** | **C** |  |
| **C** | **A** | **B** |  |
| **D** | **B** |  | **A** |
| **Metrics**: J=4, CJ=3, OJ=2, PBJ=⅔, cycle=3 on 1-count, pH=1. | | | | | |

#### 

| **Y (oogle)** | | | | Comfort for 4. |
| --- | --- | --- | --- | --- |
|  |  | **Beat** | | On whatever count you prefer (e.g. 3-count is pleasant), pass as tabulated, noting you pass to a different person than you receive from. **B** has to relax as they receive crossing throws from close range. **C** and **D** have to take care with long passes to **A** and lofty passes to **B**. |
| **Juggler** | **Right** | **Left** |
| **A** | **C** | **D** |
| **B** | **D** | **C** |
| **C** | **B** | **A** |
| **D** | **A** | **B** |
| This stationary Y is the basic building block for the *Oogle Boogie* moving patterns.  **Metrics**: J=4, CJ=3, pH=1, cycle = 2 (1) on odd (even) base, OJ=2 (1). PBJ=1/count. | | | | |

#### 

| **Luke’s Oogle** | | | | | | Dropbacks are fun. |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat (3-count base)** | | | | Set up as shown with right-hand start, and with **B** eventually passing dropbacks (right-to left and left-to-right) to **A**. 3-count is standard, but 5-count is nice.  You can piece together rearrangements like in *Oogle Boogie.*  Pattern by Luke Emery, 1998 |
| **Juggler** | **1** | **2** | **3** | **4** |
| **A** | **C** | **D** | **C** | **D** |
| **B** | **D** | **C** | **A** | **A** |
| **C** | **B** | **A** | **D** | **B** |
| **D** | **A** | **B** | **B** | **C** |
| **Pro tip:** For **B**’sdropbacks**,** bring the throwing hand close to your nose and release the club as late as possible without hitting yourself!  **Metrics**: J=4, CJ=3, OJ=11/4, pH=1, cycle=4 on odd count, PBJ=1/count. | | | | | | |

#### 

| **Y2K** | | | | The dropbacks and dropforwards make this one of the most difficult non-extra-club stationary patterns that we know! | | |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Juggler** | | | | **A** and **B** are out of phase from **C** and **D,** as in call-response.  Pattern by Prof Mike, December 31, 1999 (hence the name!).  Doable if Peter Kaseman is **B**! |
| **Beat** | **A** | **B** | **C** | **D** |
| **1** |  |  | **B** | **B** |
| **2** | **C,D** | **A,A** |  |  |
|  | | | | |
| Version 1   * + **A** and **B** both face same direction, towards **C** and **D**   + Synchronous 1-count passes from **A** to **C** and **D**   + Synchronous 1-count dropbacks from **B** to **A**   + **C** and **D** are on crossing 2-count   + **C** on 2-count rights to **B’s** right hand   + **D** on 2-count lefts to **B’s** left hand   Version 2   * + **B, C,** and **D** all face **A**   + **A** passes synchronous 1-count to **C** and **D** as before   + **B** passes synchronous 1-count to **A**   + **C** and **D** drop forward over **B’s** shoulders to **B!**   At **B’s** discretion**, B** rotates so as to alternate between version 1 and version 2! The passer-receiver pairs are all the same in the two versions, but **B** is turned around! *Y2K* generalizes the synchronous 1-count feed, so it’s a call-response pattern (i.e., passer/receiver’s are offset wrt release time). Switch positions so that everyone can experience the challenge!  **Metrics**: J=4, OJ=5/4, CJ=3, pH=1, cycle=2, PBJ=¾.. | | | | | | |

#### 

| **Canoe** | | | Have 2 dropbackers and 4 passers? This could be your pattern! |
| --- | --- | --- | --- |
|  |  | **Beat** | **A** is facing **B, C, and D,** who are all facing **A**. On whatever count you like, proceed as above. **B** and **C** are passing dropbacks. You can add extra clubs or people and use a variety of passing counts.  Unknown origin, but we have been doing it since at least 1993. |
| **Juggler** | **1** |
| **A** | **B** |
| **B** | **C** |
| **C** | **D** |
| **D** | **A** |
| **Metrics**: J=4, CJ=3, OJ=1, cycle=1, PBJ=1/count, pH=1. The difficulty is in dropbacks! | | | |

### 

### **Feeds**

#### 

| **Windshield Wiper Feed** | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat (2-count base)** | | | |  |
| **Juggler** | **1** | **2** | **3** | **4** |  |
| **A** | **B** | **C** | **D** | **C** |  |
| **B** | **A** |  |  |  |  |
| **C** |  | **A** |  | **A** |
| **D** |  |  | **A** |  |  |
| * 12 clubs * **A** (the feeder) faces **B, C,** and **D** (the feedees). Usual start is right-handed. * This pattern probably predates all the other 4-person patterns in this chapter! We don’t know its origin story, but it’s a great go-to for 4 and a prerequisite for all kinds of other patterns. * 2-count lefts is good practice! * Other count bases are possible but rarely done except for the 1-count, *ultimate feed;* where **C** does 2-count lefts and **B** and **D** do 4-count. | | | | | | |

#### 

| **Typewriter Feed** | | | | |  |
| --- | --- | --- | --- | --- | --- |
|  |  | **Beat (2-count base)** | | |  |
| **Juggler** | **1** | **2** | **3** |  |
| **A** | **B** | **C** | **D** |  |
| **B** | **A** |  |  |  |
| **C** |  | **A** |  |
| **D** |  |  | **A** |  |
| * 12 clubs * Also called the *carriage return feed;* both names make sense if you ever used an old-fashioned typewriter! (Though, as presented above, it’s opposite direction of return from the standard, non-Yiddish typewriter!) * **A** (the feeder) faces **B, C,** and **D** (the feedees) * The 1-count base version has the feedees doing 3-count, which is nice; such a 1-count base is also called an *ultimate feed,* and is a pre-requisite for *El Nino* and other cool moving patterns. | | | | |  |

### **Extra Club Feeds**

#### **Ultimate Feed Plus**

***\*\*Luke, are these good for both windshield wiper and typewriter?\*\****

Add one extra club to the *Ultimate Feed* by having all the feedees throw crosses. Alternatively (the feeder can throw crosses while the feedees throw straight). The extra club feed can be done with many different spins.

* All passes in singles. (Timing is a bit wonky. Throw a little outside, especially on the middle throws.)
* Feeder and feedees all in double passes. (Feeder rights synchronized with feedee lefts.) Feels like 7 club 3-count.
* Feeder in triples ultimates, feedees in singles. (Feeder rights synchronized with feedee rights.)
* Feeder in single ultimates, feedees in triples. (Feeder rights synchronized with feedee rights.)

#### **Ultimate Feed Plus Plus**

* To add another club (14 total), throw all passes as doubles and all passes are straight from both feeder and feedees.
* Theoretically you could keep adding more clubs and higher throws, and just switching back and forth from straight to cross feedee passes with each extra club, but it gets challenging quickly.

| **Popcorn Feed** | | | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat (both hands counting)** | | | | | |  |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** |  |
| **A** | d-**B** |  | d-**C** |  | d-**D** |  |  |
| **B** |  | t-**self** |  | d-**A** |  |  |  |
| **C** |  |  |  | t-**self** |  | d-**A** |
| **D** |  | d-**A** |  |  |  | **t-self** |  |
| * 14 clubs (i.e., 2 extra) * Recall that a (6-count) popcorn pattern between 2 jugglers is a 7 club pattern where the jugglers are passing a beat out of sync. With the right hand, each juggler passes a double spin to partner, a single spin to self, and a triple spin to self. Think **3-2-1** out of the right; the left hand throws are all single spin self throws. The triple self gets released in response to the incoming double from the feeder. (As usual, empty cells indicate single self throws.) * **A** is out of sync with **B, C,** and **D**. **A** and **D** start with 4 clubs each, and **B** and **C** start with 3 each. **A** does a typewriter feed in doubles. **B, C**, and **D** all do a standard 6-count popcorn. Note that at any beat, either all feedees are on left selfs, or the feedees distribute the three popcorn throws 3-2-1 among themselves. * **A** starts with right throw and 4 clubs * **B, C** start with left self * **D** starts with 4 clubs and a pause, then right throw on beat 2 * This is a spectacular pattern, and could be a basis for a popcorn *El Nino* (future work!) * Variation: *Low Popcorn Feed*: Do single passes and double selves instead of doubles/triples. It’s fast! | | | | | | | | |

| **Gorilla (for 4)** | | |  |
| --- | --- | --- | --- |
|  |  | **Beat (both hands counting)** |  |
| **Juggler** | **See description** |  |
| **A** |  |
| **B** |  |
| **C** |
| **D** |  |
| * This is one variation on the 3-person *Gorilla*. * There are 13 clubs. **A** starts with 4. **B, C**, and **D** each start with 3. * **A** throws synchronous ultimates. **C** throws right handed 2 count. **B** and **D** throw   right handed 4 count.   * Repeat: **A** throws synchronous ultimates to **C**'s left hand and **D**'s left hand; then synchronous ultimates to **B**'s left hand and **C**'s left hand. * **C** starts a little after **A**'s first throws, with a right hand throw to **A**'s right hand, then the next right hand throw is to **A**'s left hand. In the steady state, **C** alternates feeding **A**'s right hand and **A**'s left hand with 2 count right hand throws. * **D** starts a little after **A**'s first throw (in time with **C**) and throws to **A**'s right hand. After that, **D** stays in 4 count with **A**'s right hand. * **B** starts a little after **A**'s first throw with a right hand self. After that, **B** does 4 count with **A**'s left hand. * Pattern by MAJ. | | | |

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### **Extra club Y’s (Slingshots) *[NEEDS CHECKING BY LUKE OR PETER!]***

| **Slingshot** | | | |  |
| --- | --- | --- | --- | --- |
|  |  | **Beat (2-count base)** | |  |
| **Juggler** | **1** | **2** |  |
| **A** | t-**C** | t-**D** |  |
| **B** | **C** | **D** |  |
| **C** | **B** | t-**A** |
| **D** | t-**A** | **B** |  |
| * 14 club variation of the *Y* (i.e. the *Ooogle*) * Usually right-hand counting (could be left!) * All jugglers are synced up, with **A** and **B** facing **C** and **D** * **A** starts with 4 clubs and does a triple feed to **C** and **D** * **D** starts with 4 and feeds triples to **A,** singles to **B** * **C** has a similar job to **D,** but starts with single to **B** * **B** feeds **C** and **D** in singles * By Peter Kaseman, 1999 | | | | |

| **Slingshot Minus** | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat (2-count base)** | | | | 13 club variation of *Slingshot;* should be easier!  Usually right-hand counting (could be left!)  **D** starts with 4 clubs; all jugglers on 4-count |
| **Juggler** | **1** | **2** | **3** | **4** |
| **A** |  | t-**C** |  | t-**D** |
| **B** | **C** |  | **D** |  |
| **C** | **B** |  | t**-A** |  |
| **D** | t-**A** |  | **B** |  |
| **Metrics**: J=4, CJ=13/4, OJ=2, pH=2 (average), cycle=4 on 2-count, PBJ=¼. | | | | | | |

| **Slingshot Plus** | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat (1-count base)** | | | | 14 club variation of *Slingshot Minus;* should be easier!  Both hands counting; all jugglers in 2-count rights. **B** starts left handed, and then proceeds in 2-count doubles rights to **C** and **D** |
| **Juggler** | **1** | **2** | **3** | **4** |
| **A** | t-**C** |  | t**-D** |  |
| **B** |  | d-**C** |  | d-**D** |
| **C** | d-**B** |  | t-**A** |  |
| **D** | t-**A** |  | d-**B** |  |
| **Metrics**: J=4, CJ=7/2, OJ=2, cycle=4 on 1-count, pH=2.5 (that’s high!), PBJ=½. | | | | | | |

| **Slingshot Plus Plus** | | | |  |
| --- | --- | --- | --- | --- |
|  |  | **Beat (2-count base)** | |  |
| **Juggler** | **1** | **2** |  |
| **A** | t-**C** | t-**D** |  |
| **B** | t-**D** | t-**C** |  |
| **C** | t-**B** | t-**A** |
| **D** | t-**A** | t-**B** |  |
| * 16 clubs * All right hands are triple passes * Variation of the *Y* (i.e. the *Ooogle*)!! * Usually right-hand counting (could be left!) * All jugglers are synced up, with **A** and **B** facing **C** and **D** * All juggler start with 4 clubs and do 2-count rights * **A** does a triple feed to **C** and **D** (as before) * Prerequisite: 8-clubs triple passing with partner * Created June, 1999 by MAJ. | | | |  |

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### **Extra Club Lines**

#### 

| **Death from Above** | | | |  |
| --- | --- | --- | --- | --- |
|  |  | **Beat (right hand counting)** | |  |
| **Juggler** | **1** | **2** |  |
| **A** | t**-D** | **B** |  |
| **B** | t-**C** | **A** |  |
| **C** | **D** | t-**B** |
| **D** | **C** | t-**A** |  |
| * 14 clubs * This is a fun but challenging pattern with 2 extra clubs. It requires two jugglers who are comfortable with 7 clubs 4-count back to back passing and who aren't pansies like some Madison Area Jugglers I could mention! * **A** faces **B; B** and **C** are back-to-back; **C** faces **D.** * **A** and **B** start with 4 clubs each and start passing at the same time. **C** and **D** each start with 3 clubs. * **A** passes triple to **D**, then single to **B**. * **B** passes triple back-to-back to **C**, single to **A**. * **C** passes single to **D**, triple back-to-back to **B**. * **D** passes single to **C**, triple to **A**. * Pattern by Luke Emery, 1999. | | | |  |

#### 

| **Locked Lines** | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat (both hands counting)** | | | |  |
| **Juggler** | **1** | **2** | **3** | **4** |  |
| **A** | d-**C** |  | d-**C** |  |  |
| **B** | d-**D** |  | d-**D** |  |  |
| **C** |  | d-**A** |  | d-**A** |
| **D** |  | d-**B** |  | d-**B** |  |
| * 14 clubs; **A** and **B** face right; **C** and **D** face left. * All passes right-hand doubles; **A** and **B** each start with 4; **C** and **D** start 2 in left. * To avoid dangerous collisions, **A** and **B** should throw at exactly the same time, and **C** and **D** should respond at exactly the same time. **A** and **D** can control the timing the best since they have the best visibility. * **Variation:** Do 4-count triples instead of 2-count doubles (performed by Steve, Mike, Nick, and Keenan in 2025 Madfest show.) * **Metrics:** PBJ=½; Partners=1 | | | | | |  |

#### 

| **Popcorn Lines** | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat (both hands counting)** | | | |  |
| **Juggler** | **1** | **2** | **3** | **4** |  |
| **A** |  | t-**self** |  | d-**C** |  |
| **B** | d-**D** |  | **C** |  |  |
| **C** | d-**A** |  | **B** |  |
| **D** |  | t-**self** |  | d-**B** |  |
| * 14 clubs; **A** and **B** face right; **C** and **D** face left; passes are rights * **B** and **C** start with 4; **A** and **D** start with 3   *Version 2* | | | | | |  |
| OK, this is a non-trivial stationary pattern!  **Variation:** Switch back and forth between the two versions! | **A** |  | t-**D** |  | d-**C** |  |
| **B** | **d-D** |  | **C** |  |  |
| **C** | **d-A** |  | **B** |  |  |
| **D** |  | t-**A** |  | d-**B** |  |

#### 

| **Popcorn Dropback Lines**  **B** and **C** throwing dropbacks! | | |  | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 14 clubs; **A** and **B** face right; **C** and **D** face left; passes are rights.  **A** and **D** start with 4;  **B** and **C** start left with 3. Shift **B** and C **off** the line to be more diamond shaped. |  | **Beat (both hands counting)** | | | | | |  |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** |  |
| **A** | d-**C** |  |  |  | t-**self** |  |  |
| **B** |  | t-**self** |  | d-**A** |  |  |  |
| **C** |  | t-**self** |  | d-**D** |  |  |
| **D** | d-**B** |  |  |  | t-**self** |  |  |
| *Version 2 [triples over the top!]* | | | | | | | |  |
|  | **A** | d-**C** |  |  |  | t-**D** |  |  |
| **B** |  | t-**C** |  | d-**A** |  |  |  |
| **C** |  | t-**B** |  | d-**D** |  |  |  |
| **D** | d-**B** |  |  |  | t-**A** |  |  |
| *Version 3 [why not add more passes!]* | | | | | | | |  |
|  | **A** | d-**C** |  |  |  | t-**D** |  |  |
| **B** |  | t-**C** |  | d-**A** |  | **C** |  |
| **C** |  | t-**B** |  | d-**D** |  | **B** |  |
| **D** | d-**B** |  |  |  | t-**A** |  |  |
| **Metrics:** PBJ=⅓ (v1, v2) (5/12 v3); Partners=2; \*\*Throws are big\*\* and dropbacks are hard! | | | | | | | |  |

### **Other oddities**

| **Anklet** | | | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat (1-count base)** | | | | | |  |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** |  |
| **A** | **C** | **B** |  | **D** | **B** |  |  |
| **B** |  | **A** |  |  | **A** |  |  |
| **C** | **D** | **D** |  | **A** | **D** |  |
| **D** | **A** | **C** |  | **C** | **C** |  |  |
| * 12 clubs * 4 person variation of the 6 person *Argyle Sock* * All jugglers are synced up, with **B** facing **A.** * Standard version: The corners **A, C, D** are doing a 3-count outside triangle, and **A** picks up an extra 3-count with **B**, so **A** is doing 3/2 count. (In this version the extra, “grey” passes don’t happen between **D** and **C**.) * Harder version: Everyone except **B** does 3/2 count (i.e., include “grey” passes) * This is a good stationary pattern to sharpen your 3-count/double-3-count passing. * Pattern by MAJ | | | | | | | |  |

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\*\*\*\*\*\*\*\*\*\*\*NEEDS CONFIRMING\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Luke: Not sure if I believe this one!!

#### Here’s a 4 person variation of one of the 3-person classics by Martin Frost!

| **Martin's Madness/Mildness** | | | |  | | | | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Beat (both hands counting)** | | | | | | | | | | | |  |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |  |
| **Al** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Ar** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Bl** |  |  |  |  |  |  |  |  |  |  |  |  |
| **Br** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Cl** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Cr** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dl** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dr** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| * 12 clubs * Both hands counting; right hand starts | | | | | | | | | | | | |  |



After we learned Martin's Madness, we put 4 jugglers in the positions shown and

tried to figure out if all 4 jugglers could be the feeder as in Martin's Madness

at the same time. The pattern below is what we ended up with.

Notes:

\* A and B are doing Martin's Mildness, out of sync. (straights)

\* C and D are doing Martin's Madness, out of sync. (crosses)

\* A and D are in sync, as are B and C.

Martin Frost created Martin's Madness and the variation on this page dates to 4/98 by MAJ. Martin has innovated many interesting feeds and other patterns, often with hurries and zips. Look them up, or best of all, find a Stanford juggler to help out. Also see the 3 person Siteswap Feeds.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* NEEDS CONFIRMING ABOVE\*\*\*\*\*\*\*\*\*\*\*\*\*

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## 

## **Moving Four Person Patterns**

Let’s start with some 12-club classics (i.e. no-extra clubs yet).

| **Switch Sides Feeds**  *Windshield Wiper Switch Sides Feed* | | | | | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat (2-count base)** | | | | | | | |  |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |  |
| **A** | **B** | **C** | **D** | **C** |  | **C** |  | **C** |  |
| **B** | **A** | **move** | | | **C** | **move** | | |  |
| **C** |  | **A** |  | **A** | **B** | **A** | **D** | **A** |
| **D** | **…** | | **A** | **move** | | | **C** | **…** |  |
| * 12 clubs, 8 beat cycle * Right-hand counting, start with rights [variation: do everything on lefts!] * Movers **B** and **D**, who go back and forth on 8 count; **A** and **C** are stationary, and they alternate being feeders. * The movers have a switch-side 180 degree rotation on each move on a slow 8-count * Compared to the 3-person change-sides feed, there needs to be a bit more coordination between the movers; one has to follow another or it breaks! * Formally **D** could start moving from the **C** feed, but that’s showing off! | | | | | | | | | |  |
| *Typewriter Switch Sides Feed* | | | | | | | | | |  |
|  |  | **1** | **2** | **3** | **4** | **5** | **6** |  | |  |
| **A** | **B** | **C** | **D** |  | **C** |  |  |
| **B** | **A** | **move** | | **C** | **move** | |  |
| **C** |  | **A** |  | **B** | **A** | **D** |  |
| **D** | **move** | | **A** | **move** | | **C** |  |
| * 12 clubs * Now feeders **A** and **C** alternate typewriter feeds, and moving feedees **C** and **D** are on a quicker 6-count switch * See ahead for extra-club variations that are pretty fun! | | | | | | | | | |  |

| **Eggbeater, no handle** | | | | | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Starting configuration |  | **Beat** (count of choice, e.g. 2-count is nice) | | | | | | | |  |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |  |
| **A** | **C** |  | **D** |  | **C** |  | **D** |  |  |
| **B** | **D** |  | **C** |  | **D** |  | **C** |  |  |
| **C** | **A** |  | **B** |  | **A** |  | **B** |  |
| **D** | **B** |  | **A** |  | **B** |  | **A** |  |  |
| * 12 clubs; 4 jugglers; 8 beat cycle (4-beat local passing cycle) * All jugglers are synced up, with **A** facing **C** and **B** facing **D** to start * Rule: pass twice then move; moves are all lateral (arrows), there’s no rotation. * 4 person variation of the eggbeater or also like the 6 person *stick-on-the-end weave*; since you’re always on an end, you stick for two passes in each spot * 2-count base is fast for beginners (jugglers are on 4 count), but you can slow it down as you like. * We say **A** and **B** start as no-stickers and **C** and **D** start as stickers * Shallow moves risk you knocking down your partner's pattern! * Metrics: PBJ=¼ (on 2-count); spin=0; motion=1 JU, assuming pairs start ½ JU apart (maybe they are a bit more distant!) * Pattern by Prof Mike and MAJ, 1997 | | | | | | | | | |  |

| **Unicycle** | | | | | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| starting configuration |  | **Beat** (3-count base) | | | | | | | |  |
| **Juggler** | **1** |  | **2** |  | **3** |  | **4** |  |  |
| **A** | **C** |  | **C** |  | **D** |  | **D** |  |  |
| **B** | **A** |  | **A** |  | **A** |  | **A** |  |  |
| **C** | **B** |  | **B** |  |  |  |  |  |
| **D** |  |  |  |  | **B** |  | **B** |  |  |
| * 12 clubs; 4 jugglers; 4 beat cycle * **B** is doing 3-count back-drops to **A** (the seat); they are both stationary * **C** and **D** form the wheel, with 2 passes to the post (a right then left) followed by two phantoms while on the bottom of the wheel; moving steadily for a smooth ride! * Prior versions of Pattern Book had the wheel spinning counter-clockwise; both versions work, but the one here seems more standard! * The 3-count version here is hard for beginning movers; 5-count is cleaner; even counts are ok but require more lateral movement for the common-hand passes to clear **B**’s space! * Metrics: PBJ=¼ (on average); spin=0; motion=perimeter of circle for movers, say JU, **C** and **D** are JU apart! \*closer to 2 JU for flattening effect\*? * Pattern by MAJ, 1996. Performed by Mad-5+1 at the 1999 Madfest | | | | | | | | | |  |

| **Benzene Ring (Four Juggler Version)** | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat, base count** | | | |  |
| **Juggler** | **1** | **2** | **3** | **4** |  |
| **A** | **D** | **C** | **C** | **D** |  |
| **B** | **C** | **D** | **D** | **C** |  |
| **C** | **B** | **A** | **A** | **B** |
| **D** | **A** | **B** | **B** | **A** |  |
| * 12 clubs; 4 jugglers; 4 beat cycle on base count; 3-count or slower works well; pass twice to each feeder, then turn, in steady state. * There is a whole family of benzene ring patterns, where movers juggle in a circle between two feeders. The *Benzene Ring* *for Six* and *for Eight* are easier patterns to learn, but *Benzene Ring for Four* is more fun. In 3-count we also call this *spinning 3-count.* It’s also a 2-seated unicycle without the seats, going backwards! And it’s a precursor for the *razor*. * **Pro tip:** Feeders pass their odd (right-side) throws deep to help the movers turn. * PBJ=⅓ (3-count base); spin =2 over 12 1-counts in full cycle; distance is 2.2 JU per mover, as above. * 3-count pattern created July, 1997 by MAJ. Performed by Peter, Mel, Mike and Dan at Madfest 1998. | | | | | |  |

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| **Chocolate Stir** | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat (both hands counting)** | | | | | | | |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| **A** | **C** | **C** |  |  | **D** | **D** |  |  |
| **B** | **C** | **D** |  |  | **D** | **C** |  |  |
| **C** | **A** | **A** | **½ pirouette** | | **B** | **B** | **½ pirouette** | |
| **D** | **B** | **B** | **½ pirouette** | | **A** | **A** | **½ pirouette** | |
| * 12 clubs; 4 jugglers; right-hand start. * Pass-pass-self-self is chocolate bar, so with the ½ pirouette’s we get chocolate stir * Difficulty: PBJ = ½; spin= per cycle. * Pattern by Luke Emery | | | | | | | | | |

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#### **2/3 with Post**

Recall the 3-person pattern. Add a stationary post (juggler **D**) who feeds the same count as everyone else, but who alternates passes to the left and right side of the figure-8. Starting positions might be like this: **B** passes to **A** and moves through, picking up post **D** on the second throw.

Difficulty: all jugglers on same count, e.g. 5-count comfortable PBJ=⅕.

Feeder **D** is stationary; others move (6 positions) with spin per 6 base-beat cycle.

| **Oogle Boogie** | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| Positions/Passes |  | **Beat**  2-count base is standard | | | | |
| **Juggler** | **1** | **2** | **3** | **4** | **…** |
| **A** | **C** | **C** | **C** | **move** | **…** |
| **B** | **D** | **D** | **D** | **…** | **…** |
| **C** | **B** | **B** | **B** | **…** | **…** |
| **D** | **A** | **A** | **A** | **…** | **…** |
| * 12 clubs; 4 jugglers; 16 beat cycle full cycle; 4 beat local cycle; right-hand start * Rotating Y pattern in which jugglers make 3 repeated passes and then move to the next position. * The version shown is for right-handed passing; usually 2-count, but slower is fine for starters. 3-count is nice, but then the arrows all change directions on the left-hand beats. * A nice feature of *Oogle Boogie,* as evidenced by the passing table, is that in spite of the moves, each juggler has one person they always pass to and another person they always receive from (those folks alternate in odd-count versions). * There’s no particular reason for 3 stationary passes per local cycle, except that’s how we have always done it! The space (phantom beat) allows jugglers to move leisurely to their next position. * **Variations**: The *Fast Oogle Boogie* drops the space (4th) beat. Alternatively, reducing the stationary beats from 3 to 1 gives a constantly moving Y, which goes nicely on a 4-count or 5-count base (and has 4-beat full cycle). Slowing things down, we can also have an intermediate 2-on-2 configuration in between each Y configuration (*Slow Oogle Boogie)*. As shown, both wheels are clockwise (from above); both could be counterclockwise (arguments might arise on the proper choice!), or one could be clockwise and one counterclockwise. In the first two cases, you retain that nice feature of passing always to the same person. * PBJ = ⅜ (standard version); spin=0; distance = 2 JU if you think of moving on the diamond of side length ½ JU, or 2.2 JU if you think of moving in a circle (this has **C**-**D** start JU apart; i.e. a bit more than in a simple feed). **\*\*maybe a flatter circle is closer to 2 JU anyway\*\*** * MAJ have been doing this since 1991, but its origin is unknown to the authors; the Mad-5 performed *Oogle Boogie* at Madfest in 1997. | | | | | | |

If you like the 5-person *Star*, this is a fun variation when you’re missing a juggler!

| **Shooting Star** | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| Positions:    After step (4), notice **B** moves, and we’re back to the configuration of (1), but rotated 2 clicks (each 2/5) clockwise, i.e. 144 degrees. Blanks in passing table are where you don’t have enough clubs; and you don’t pass [in the steady state, that’s where you **move**] |  | | **Juggler** | | | |
| **Position** | **Beat**  **2-count** | **A** | **B** | **C** | **D** |
| **1** | **1** | **D** |  | **A** | **B** |
| **2** | **D** | **A** | **B** |
| **3** | **D** | **A** | **B** |
| **2** | **4** | **D** | **C** |  | **B** |
| **5** | **D** | **C** | **B** |
| **6** | **D** | **C** | **B** |
| **3** | **7** |  | **C** | **A** | **B** |
| **8** | **C** | **A** | **B** |
| **9** | **C** | **A** | **B** |
| **4** | **10** | **D** | **C** | **A** |  |
| **11** | **D** | **C** | **A** |
| **12** | **D** | **C** | **A** |
| * 9 clubs; 4 jugglers;12 beat local cycle; 60 beats to rotate back to original positions * **A**, **C**, and **D**, each start with 3 clubs; **B** starts with none; right hand 2-count * **A** will run out of clubs since no-one is passing to them. When out of clubs, **A** moves to the empty spot. The pattern continues so that each juggler will run out of clubs and move to a newly vacated empty spot. When you pass, you always pass to the same person * **Variations:** Add some flair by pirouetting through the middle! Drop 2 clubs instead of 3 clubs and always move with one; this makes each block a 2-beat block instead of 3 as above. Add multiple clubs and up the passes to doubles and/or triples, but those options have been mostly theoretical! | | | | | | |
| * **Pro Tip:** Move to the center as you throw your last club, and just after a club whizzes by in front of you; then turn around 180 and move out backwards just after the next pass whizzes by the back of your head. (Some jugglers [e.g., Mel!] try to run through quickly to avoid getting hit in the head, but that usually ends in disaster!) It’s best to make it a two-step move: one step into the middle after releasing your last club, then one step out backwards after the next pass (where you’re on a self). * **Metrics:** One position exchange (1 JU) and one 144 degree rotation (4 rad) per juggler per 12 beat local cycle. 9 throws per 12 base (right-hand) beats: PBJ=3/8. Because you need to avoid passing lanes and you pass-receive from different people, most beginners find this one more difficult than *Oogle Boogie* or *Weave*. * *Shooting Star* was created by Bryan Olson in 1993 (not in Madison!!) | | | | | | |

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| **Weave** Here’s where the fun really begins! | | |  | | |
| --- | --- | --- | --- | --- | --- |
| Position detail: |  | **Juggler** | | | |
| **Base Beat** | **A** | **B** | **C** | **D** |
|  | **Start position** | | |
| **1** | **9** | **5** |
| **1** | **B1** | **A** |  |  |
| **2** | **C10** |  | **A** |  |
| **3** | **D7** |  |  | **A** |
| **4** | **B4** | **A** |  |  |
| **5** | **C1** |  | **A** |  |
| **6** | **D10** |  |  | **A** |
| **7** | **B7** | **A** |  |  |
| **8** | **C4** |  | **A** |  |
| **9** | **D1** |  |  | **A** |
| **10** | **B10** | **A** |  |  |
| **11** | **C7** |  | **A** |  |
| **12** | **D4** |  |  | **A** |
| * 12 clubs; 4 jugglers;12-beat cycle; 3-beat local cycle * The *standard weave* uses right-hand start and 2-count base (so weavers are on 6 count). This is a great pattern to master because it leads to many other exciting patterns. The weave is probably the most popular 4-person moving pattern! Thinking of jugglers as props, the weave is like a giant’s cascade pattern. * The feeder, **A**, throws to the end, middle, end, middle and then repeats, passing on the base beat, which is ordinarily a 2-count right. Each weaver, (**B,C,D**), passes in their current position and then moves to the next position. For the standard weave, the three weavers pass in a 6-count, * **Rule:** Move back on the ends and forward in the middle in a figure-8 pattern. When starting, the middle weaver moves towards the side that passes to the feeder first. * There are 12 positions indicated in the table and each weaver moves through them in sequence, with starting positions indicated and with passing positions indicated as subscripts for those passing to feeder **A.** For instance, weaver C starts in position 9 but by beat 2 is in the middle, at position 10. * **Pro tip:** Beginning weavers have a tendency to move well side-to-side but not so well backwards and forwards; think of the pattern more like a bowtie than a figure 8 if that's a problem. Beginning feeders often fail to provide appropriate leads to the weavers; usually they want deep on the ends, loopy and in the right direction in the middle. * **Drops:** They happen, but don’t change the flow of the pattern to pick up; just wait till you weave again close to the dropped pass to do so, or just steal from the feeder! * **Variations:** There are tons of variations of the weave. For starters, you can change the direction (so-called *inverted weave*), which has forward on the end and back in the middle as the basic rule. After passing on an end, be sure to wait for the middle pass before you move into the middle, else you’ll get hit!. Whether standard or inverted, there are all sorts of timing variations that amount to modifying the base beat; these all involve a 12-base-beat cycle, but could be slower or faster (or weirder!) than the standard. For example 3-count base has the feeder on 3-count and each weaver on 9-count–very pleasant for sure, but 9 is fairly slow and some of us have trouble counting that high! We often do a 3/2 base beat (i.e., feeder on pass-pass-self), which then leads to an interesting alternating 4-count/5-count cycle for the weavers. There are two ways to do that; we usually prefer the feeder starts pass-self-pass-pass, and so that makes a 5 count after you pass on the end and a 4-count off the middle. (We call that a *4-5 weave*.) Faster bases are **bas**icallyimpossiblefor mortal jugglers; for instance the *hyper-weave* is on a 1-count base, with weavers on 3-count. More feasible is the 1-2-on-a-4-count base, where the feeder is doing chocolate-bar (pass-pass-self-self); more pleasant is 1-3-on-a-5-count base, which nicely balances hands. Also, 1-3-5-on-a-5-count makes the weavers all do 5-count, and the feeder then has 3-passes on 2-count followed by a 1-count switch. Something for experts is 1-2-3-on-a-4-count, which has the weavers flying on 4-count and the feeder simply doing pass-pass-pass-self; note one weaver does 4-count lefts in that variation! * **Tricks:** Pass a self-triple with the right just after passing in the middle position, which allows you to pass again to the feeder on the next right-hand opportunity. Other fun involves switching out who is feeder on the fly! * **Metrics:** PBJ = ⅙ per weaver, ½ for the feeder; mean=¼. No rotation (spin=0). Thinking of the shape as a lemniscate, motion=perimeter= JU , assuming feedees start each 1/ JU apart (i.e. a bit wider than for a stationary feed; width of weaver line = JU; remember JU = juggling unit = distance separating typical passers!). Partners=1 for feedees and 3 for feeder, mean=. \*\*almost JU…2 per loop probably a good average\*\* * **Origin:** The *standard weave* is an old pattern. For sure the Flying Karamazov Brothers were weaving in the 1980's, and maybe earlier. Prof. Mike saw them at a show in Seattle in the late 80's and became hooked on club juggling after that! The MAJ have been weaving since 1992, or earlier! | | | | | |
|

#### **Close cousins of the weave**

| **Dresser Drawer Weave** |  |
| --- | --- |
|  |  |
| * This weave variation has the same passes as the standard weave, but the weavers move side-to-side like dresser drawers instead of through a figure eight. Usually we debate whether **B** is the socks or underwear drawer. Each juggler has its own slot (i.e., *drawer)* to move on. Each slot has three positions: left, middle, and right. Weavers move back and forth on their slots. Moves are made to the next position after the pass is made from the current position. * Metrics: \*\* |  |

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| **Inside Out Weave** | |  |
| --- | --- | --- |
|  |  |  |
| * Take the path of a standard weave -- a figure eight (lemniscate!) -- and imagine warping space so that one of the loops shrinks a bit and is folded back inside the other. That's the *Inside-Out Weave.* * The count and the passes are exactly as in the *standard weave*, but the jugglers move in a small loop from the new center (which is in the middle, but has the count and movement for an end) to the “middle” (which is now on the outside), and then in a large loop back (the other end) . In the loops, always move forwards for the “middle” and backwards from the “ends”. The passing lanes can be somewhat narrow, so be careful, or you might bruise your ZOC. If the feeder is on a 3 or 4-count base it’s quite manageable. The 2-count base is how we started, and is a good exercise of your moving technique! * **Rule:** As feeder, think small-middle-big-middle. * **Metrics:** Same as *standard weave,* except more distance traveled per cycle: motion = \*\*. * **Variations:** *El Turmeric weave* * Pattern by Prof Mike. | |  |

| **That’s a Good One** | | | | | | | | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Beat** (1-count base; i.e., both hands counting; 24 beat full cycle) | | | | | | | | | | | |  |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |  |
| **A** | **C** |  | **C** |  | **B** |  | **B** |  | **D** |  | **D** |  |  |
| **B** |  | **D** |  |  | **A** |  | **A** |  |  | **C** |  |  |  |
| **C** | **A** |  | **A** |  |  | **D** |  |  |  | **B** |  |  |
| **D** |  | **B** |  |  |  | **C** |  |  | **A** |  | **A** |  |  |
| * For a count challenge with no extra clubs, but in the standard weave formation, the feeder (**A**) passes 2-count, twice in a row to each feedee on each side. Feedees (**B,C, D**) throw: 2 throws of 2-count, 3-count transition, left-handed 4-count, 3-count transition, and repeat on the other side. Set up with **A** facing **B, C, D,** with **C** in the middle, moving forward and to the left. (Also called, *It's a good one.*) * **Metrics:** 12 clubs; 4 jugglers; 24 count full cycle on 1-count. 4 throws/12 beats for weavers; feeder on 2-count; mean PBJ=3/8. Weavers have two sharp 90 degree turns beyond standard weave; spinnyess per weaver per cycle. Distance travelled as in *standard weave* (JU per cycle, or 4…). Partners (OJ) =3. * Positions at a few steps shown below: | | | | | | | | | | | | |  |
|  | | | | | | | | | | | | |  |

| **That’s a Really Good One** Refer to the passing sequence from *That’s a Good One,* but allow weavers to convert to feeders as they come off the right loop. Noting there’s no pass on beats 4, 8, 12, etc, below is the first passing section in which juggler **C** switches from coming off the right loop through the middle and then into and out of the feed position. **C** does 6 2-count throws while completing a 360 degree turn.      In each cycle each juggler does  6 throws (5 2-count gaps); 1 3 count gap  1 throw; 4 count gap  1 throw; 3-count gap  2 throws on a 2-count gap; 1 3-count gap  1 throw; 4-count gap, 1 throw  Back to start.  Inspection confirms that 12 throws are done by each juggler per full cycle; each full cycle is 32 beats (both hands). | This is a challenging, no-extra-club moving pattern. It starts in the same set up as *That's a Good One*, but the feeder also gets to move. In the favored version, every weaver coming into the middle from the right (i.e., weaver's right; feeder's left) passes to the feeder and then moves into the feeder position to become the (temporary) feeder, completing a 1/2 turn in order to face the weavers. Meanwhile, the former feeder vacates the feeding position and continues to the (weaver) left, the destination of the person who he/she just exchanged with, had they not swapped spots.    In the figure, **F** is the feeder spot, **M** the middle, **L** the left (weaver perspective) and **R** the right from that perspective.  You find in running this that the maneuver into and out of the feed entails a series of 6 2-count passes in a row while moving in a tight circle (see left). It's pretty fun!  **Metrics:** 12 clubs, 4 jugglers. Each juggler moves through 5 spots to complete a cycle (twice in **M**), and totals a full 360 degree rotation along the way. Full cycle is 32 1-count beats to get all 4 jugglers swapping into and out of the feeder spot. Distance about 6 JU (4 for weave + feeder switch).  Pattern by MIke, Steve C, Mel, and Conor on Dec 13, 2018. (btw, the pattern degenerates if you try to swap from both sides of the weave). |
| --- | --- |

| **Gandini Weave (basic)** | | | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Beat (2-count base; i.e. right-hand counting)** | | | | | |  |  |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** |  |
| **A** | **B** | **B** | **C** | **C** | **D** | **D** |  |
| **B** | **A** | **A** |  |  |  |  |  |
| **C** |  |  | **A** | **A** |  |  |
| **D** |  |  |  |  | **A** | **A** |  |
| The Gandini Juggling Project has explored a lot of interesting weaves (see Chapter 12 for more examples, especially with more jugglers). We call any weave a *Gandini Weave* if the weavers always pass in the middle of the figure 8 loop, although the Gandini's have innovated many other interesting weaves besides what we know. We don't know even know what the Gandini's call them! This is a simple Gandini Weave that is a great foundation for other patterns.  In this weave all the weavers move in a figure 8, but they always pass from the middle and never from an end. The feeder is in 2-count, the feedees throw 2 right hand passes in a row, and then 4 right hand selves (PPSSSS). It's easiest to start with the weavers stacked in a line all facing the feeder.   * Feeder (**A**) passes twice to the first weaver (**B**), then that weaver goes to the right. * **A** then passes twice to the second weaver (**C**), then that weaver goes to the left. * **A** then passes twice to the third weaver (**D**), who follows **B**. * Then repeat, with each weaver passing twice to the feeder and then moving in the   opposite direction of the previous weaver.  **Metrics**: 1 feeder on 2-count; 3 weavers at 12-on-2-count; passing from one position but motion through figure 8; 0 spin. [on 2-count-base PBJ=⅙ for 3 weavers and ½ for feeder; mean PBJ=¼]. ] JU  Timing variations are many, though too slow is a bit boring and easy for weavers to lose count, and two fast is, well, too fast. Putting the feeder on a 3-count base is nice, but see *Gandini Site Swaps* for more on that. We learned about this family of weave variations from juggling with Sean Gandini and the Gandini Juggling Project in 2000. | | | | | | | |  |

#### **Three Leaf Clovers**

Clovers are a distinctly Madison innovation in club passing. There are many variations, but most entail every juggler moving through a clover-leaf trajectory and all offset but following the same passing sequence.

The clover leaf patterns have a juggler on each *leaf*, and one in the middle, all moving. As the pattern progresses, the juggler in the middle trades places with a juggler on a leaf, *pushing* that juggler out of his/her leaf and back into the middle towards the next leaf in the sequence, and passing along the way. There are a variety of passing sequences that fit into this clover motion sequence, but this one has become our default (it’s about the 4th one in the clover evolution!)

| **Three Leaf Clover (Standard and Run-Over)** | | | | | |  | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Set up 1 per leaf and one middle. |  | **Beat** | | | | | | | |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| **A** | **D** | **B** | **C** | **B** |  | **B** |  | **B** |
| **B** |  | **A** |  | **A** | **C** | **A** | **D** | **A** |
| **C** |  | **D** | **A** | **D** | **B** | **D** |  | **D** |
| **D** | **A** | **C** |  | **C** |  | **C** | **B** | **C** |
| **Rule:**  Feeder sweepsright to left, then **2-in-2-out** move along arc to replace the person on your left.  **Pro tip:** After your feed, move out to about 2 o’clock to your right, and also rotate clockwise (from above), opening up to your middle pass as you translate left.  **Variations:** The standard version is a 2-count base beat, but 3-count and 4-count are fun too. Over the last year or so we often do this on one of the variable counts, like 1-3-on-a-5-count, or 1-3-5-on-a-7-count. Additional (grey) passes are optional; we call that a *Run-Over-Clover;* it makes the move **1-in-1-out**, which goes nicely on a 3-count base rather than the faster 2-count. Watch the 3-count *run-over-clover* with colors, recorded during the COVID pandemic: <https://www.youtube.com/watch?v=bJLnODIlHMI>  **Metrics:** J=4, CJ=3, OJ=3, pH=1, full cycle = 24 beats (on base count); 8 beat local cycle. 4 passes/8 base beats per juggler (2-count standard has PBJ = ¼ ); the 3-count base *run-over-clover* has PBJ=¼ also! spin 2 to complete the three leaves; per leaf. Distance per cycle is three times the arc length from one leaf to the next, which can be seen to equal the circumference of the smallest circle containing the three leaves. The radius of this circle is surely less than 1 JU; perhaps 1/ JU is about right, which makes the distance per cycle = 4.4 JU.  **Origin:** Prof Mike created this clover in 2000, then the *run-over* in 2001 with the MAJ. This is not the original clover; it was called *the new one* in earlier versions of the pattern book, but it’s become the MAJ standard! | | | | | | | | | |
| Local cycle: **A** starts the feed and ends one leaf to the left ready to start a second feed. | | | | | | | | | |

| **Standard Three Leaf Clover: Detailed View** | |
| --- | --- |
|  | There are 18 positions in the standard 3-leaf clover. Jugglers move from leaf to leaf. Positions 1, 7, and 13 are the tips of the leaves; in the standard clover, you are a feeder for three beats while in one of those spots. After your feed, you have two beats to enter the middle (M=4, 10, 16), and then two more to get to the next tip, on the leaf to the left of your previous feed. Feeds overlap, with the last pass of one feeder being the first pass of the next feeder; and so the feed itself moves clockwise around the tips.    We conceived this as a 2-count pattern, but we find it's great to learn on a slower 3 or 4 count,  and that opens up opportunities for more passes (see *zigzag*, and *pollinator*).    Passes are either between two feeders or a feeder and someone transitioning through the middle. The 8 beat local cycle resets the jugglers into their original *relative* positions, but it takes 24 beats for the pattern to get back to its original state.  This standard is not the first MAJ clover, but it’s the best one! There's a beautiful symmetry to the pattern once it gets going. I hope you  enjoy it as much as we do! |

Check out Nathan's piano roll \*\*WHERE\*\* to see also the trajectory of all 12 clubs, and how long it takes to get them back in order.

| **Zero in Zero Out (ZIZO) Clover (aka ZigZag)** | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| starting configuration |  | **Beat (5-count base)** | | | | | | | |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| **A** | **D** | **B** | **C** | **B** | **D** | **B** | **C** | **B** |
| **B** | **C** | **A** | **D** | **A** | **C** | **A** | **D** | **A** |
| **C** | **B** | **D** | **A** | **D** | **B** | **D** | **A** | **D** |
| **D** | **A** | **C** | **B** | **C** | **A** | **C** | **B** | **C** |
| **Rule:** Same as moving/passing as the *standard clover*, but all empty beats are filled in. Only workable on a slower count; we like 5-count, where all lefts go to the same person and your rights alternate. Requires major rotations to make it through!  **Metrics:** 8 passes/8 base beats per juggler on the base beat; so PBJ=⅕ on 5-count, but the spinning makes it super hard; spin may be per local cycle! Distance travelled the same as the standard clover = 4.4 JU. J=4 jugglers, CJ=3, OJ=3, pH=1. Full cycle = 24 beats, 8 local.   * [link the ZIZO video] * [See the piano role] \*\*On Mark laughing as we try get it to work!\*\* Dizziness metric! | | | | | | | | | |

##### **More Obscure Clovers**

| **Mike’s Original Clover** | | | | | |
| --- | --- | --- | --- | --- | --- |
| starting configuration |  | **Beat (4-count base)** | | | |
| **Juggler** | **1** | **2** | **3** | **4** |
| **A** | **B** | **D** | **C** | **D** |
| **B** | **A** | **C** | **D** | **C** |
| **C** | **D** | **B** | **A** | **B** |
| **D** | **C** | **A** | **B** | **A** |
| * 12 clubs; 4 jugglers; 4 beat local passing cycle; 8 beats to complete ⅓ of a full rotation where relative positions reset; 24 beat full cycle; Typically a right-hand start and 4-count base. * **Nice feature:** Every juggler is a feeder passing a windshield wiper feed to the other 3 jugglers (on the base count). * **Variation:** Faster than 4-count is hard. 5 count is nice! * **Metrics:** More spinny than standard (about 3 per cycle). PBJ=¼; same distance as standard clover. * Performed by Mad-5 at 1998 Madfest (4-count base version). | | | | | |
| 2 local cycles: **B** pushes **A** out of top leaf, **A** moves on to push **C**, who pushes **D**, and so on. | | | | | |

##### 

| **Peter’s Clover** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| starting configuration |  | **Beat (4-count base)** | | | | | |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** |
| **A** | **B** | **C** | **D** | **B** | **D** | **C** |
| **B** | **A** | **D** | **C** | **A** | **C** | **D** |
| **C** | **D** | **A** | **B** | **D** | **B** | **A** |
| **D** | **C** | **B** | **A** | **C** | **A** | **B** |
| The MAJ juggles the *Standard Clover* more often than this version, which is a nice variation if you can remember the passing sequence!   * 12 clubs; 4 jugglers; 6 beat local passing cycle; 12 beats to complete ⅓ of a full rotation where relative positions reset; 36 beat full cycle; Typically a right-hand start and 4-count base. PBJ=¼. * **Nice feature:** Every juggler is a feeder passing a modified typewriter feed to the other 3 jugglers (on the base count). * The movement around the leaves is reversed from all the other clovers we do! The starting positions are also different, but the *leaf-push* rule is the same. | | | | | | | |

| **Steve’s Clovers** | | | | | Elaborate clovers with built-in triangles! | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Starting configuration, **D** heading into **C’**s leaf. |  | **Beat [4-count base]** | | | | | | | |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| **A** | **D** | **B** | **D** |  | **D** | **D** | **D** | **B** |
| **B** | **C** | **D** | **C** | **D** | **C** |  | **C** | **C** |
| **C** | **B** |  | **B** | **B** | **B** | **A** | **B** | **A** |
| **D** | **A** | **A** | **A** | **C** | **A** | **C** | **A** |  |
| The passing rate and movement along the leaves is the same as in Mike's original clover. On the odd-numbered beats in Steve's versions, **A** and **D** always pass to each other, and likewise **B** and **C**. For the even-numbered passes, three jugglers pass to each other in a triangle, and the left-out juggler gets bumped off its leaf. You get three variations based on inside-only, outside-only, or alternating passes. (Tabulated above on even beats are for the insides-triangle version.) Pattern by Steve Otteson.      **Metrics**: J=4, CJ=3, OJ=3, 8 4-count beats to complete ⅓ of a full rotation where relative positions reset; 24 beats in full cycle. PBJ=7/32, pH=1, distance=\*\*, spin\*\*  **Idea:** Run the three-person laxative in place of each insides triangle! | | | | | | | | | |

###### \*YET ANOTHER WEIRD CLOVER\*

See church video Oct 17, 2024

**El Patterns**

We saw *El Turmeric Weave* in the weave section earlier in the book. That’s one of a series of 4-person advanced moving patterns. The first and coolest in that series is *El Niño*, which was created during the famous 1997 meteorological event by the same name! [https://en.wikipedia.org/wiki/1997%E2%80%9398\_El\_Ni%C3%B1o\_event.](https://en.wikipedia.org/wiki/1997%E2%80%9398_El_Ni%C3%B1o_event)

| **El Niño** | | | | | | | | | | | | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Beat** (1-count base; i.e., both hands counting; 16 beat full cycle) | | | | | | | | | | | | | | | |  |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** |  |
| **A** | **C** | **D** | **B** | **C** |  | **B** |  |  | **C** |  |  | **C** |  |  | **D** |  |  |
| **B** |  |  | **A** |  | **D** | **A** | **C** | **D** |  | **C** |  |  | **D** |  |  | **D** |  |
| **C** | **A** |  |  | **A** |  |  | **B** |  | **A** | **B** | **D** | **A** |  | **D** |  |  |
| **D** |  | **A** |  |  | **B** |  |  | **B** |  |  | **C** |  | **B** | **C** | **A** | **B** |  |
| *El Niño* is a rotating 1 count feed and is one of the crown jewels of the MAJ. It is a challenging pattern, but quite doable once passers master the stationary *1-count feed* and the *2 on 2 double 3-count box.* It is essentially a continuous switch-sides 1-count feed. And once you master it, you can join the Madison elite group of jugglers who can do *El Niño*!   * Start **left-handed** *(we sometimes call this the modern start!)* * Notice there’s a single switch-side move connecting a typewriter-*1-count feed* of 3-counters and a *2-on-2 double three count box*. Initially, the version here was considered the “fast version”, with slower versions stepping between the feed and box. The discovered version reported here smooths all this into a beautiful 16 beat moving pattern. * **Rule:** Move forward off the feeder’s left side of the feed, while passing a right and similarly receiving a pass into your inside (left) hand. * **Variations:** The mirror image (1-count feeding left to right) is called *La Niña*. Move on left throws instead of rights and start with a right pass in the middle. There are other fun ways to rotate a 1-count feed. Tarim? demonstrated a pattern similar to 1-count *El Nino* where the mover transitions in 4-count instead of 3-count (leaving on a left hand throw in the above picture instead of a right, and joining the double three count box on the opposite count. He also goes the wrong direction like La Nina! :) * \*\*video/MAJ show; game to play with 5\*\* * **Metrics:** PBJ=½; spin ; lots of motion! [figure out actual number of spots] * *El Niño* dates to August, 1997 by Peter Kaseman and MAJ. | | | | | | | | | | | | | | | | |  |
|  | | | | | | | | | | | | | | | | |  |

| **El Turbo** | | | | | |
| --- | --- | --- | --- | --- | --- |
| 16 beats and 16 configurations    **Metrics:**  16 beat cycle, best on 2-count, but nice on 3-count  PBJ = ¼ on 2-count, ⅙ on 3-count  With extra passes (2-count), (3-count)  spin= ; motion through 8 positions  OJ=3; Distance about 4 JU’s per cycle (2 loops). |  | **Juggler** | | | |
| **Base Beat** | **A** | **B** | **C** | **D** |
| **1** | **B** | **A** |  |  |
| **2** | **D** |  |  | **A** |
| **3** | **C** |  | **A** |  |
| **4** | **B** | **A** | **D** | **C** |
| **5** |  |  | **D** | **C** |
| **6** | **C** |  | **A** |  |
| **7** |  | **C** | **B** |  |
| **8** | **B** | **A** | **D** | **C** |
| **9** | **B** | **A** |  |  |
| **10** |  | **C** | **B** |  |
| **11** |  | **D** |  | **B** |
| **12** | **B** | **A** | **D** | **C** |
| **13** |  |  | **D** | **C** |
| **14** |  | **D** |  | **B** |
| **15** | **B** |  |  | **A** |
| **16** | **B** | **A** | **D** | **C** |
| Unnecessary but cool extra passes are grey above and dashed lines in figure. | | | | |
| *El turbo* is a turbo-fied version of *El Niño*. The idea is to cross through the center of the pattern when you make your change-side, as in the 3-person *Turbo*. It might not be theoretically possible at the *El-Niño* 1-count base, so we usually do it in a right-handed 2-count or more gently in a 3-count. We often count it 1-2-3-4, four times on the base beat, with each set corresponding to one person being the feeder. For example, juggler **A** starts as the feeder (first row in figure), then it goes to **C**, **B**, and **D**, in that order. Notice that beats 1 and 4 of each feed go to the same feedee. You'll also notice that the pattern is *chiral,* as we say, which means that it has a specific orientation; a backwards version would be different. In the figure, for example, movement through the middle always goes left to right. Movers (e.g., **C** at the start) need to move swiftly into their next position immediately after the feeder passes their first throw.  Watch: 3-count *El Turbo* with colors <https://www.youtube.com/watch?v=5ORfAzSpCcU>  Two extra passes per cycle per juggler fit in nicely (grey in table and dashed lines in figure) make a more difficult pattern, including 6 passes in a row on the base beat. There are also opportunities to pass to stationary jugglers on the left or right side of the pattern, making it a 5 or 6 person variant (in place of the extra passes). (See El Turbo ++)  Created by the MAJ on 8/25/2011. | | | | | |
|

##### **Tomahawk**

This is an *El Turbo* variation. Slow down the 2-count *El Turbo* base to 3-count; then *tomify* by replacing each *pass-self-self* with a *pass-pass-pass*. It has nice club color coordination like *Tom's Turbo*. It's pretty heavy duty; e.g. as you cycle into your feeder position you end up doing 1-count for 12 passes! Same spin, motion, and partners as *El Turbo*, but cycle length is 48 on 1-count base. Ignoring extra passes, PBJ=½.

| **El Turmeric (Weave)** | | | | | | | | |  | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Beat (standard 2-count base, 3-count more comfy!)** | | | | | | | | | | | | | | | |
| **Juggler**  position | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** |
| **A** | **C** | **B** | **D** | **C** |  | **D** |  |  | **C** |  |  | **C** |  |  | **B** |  |
| F | F | F | F |  | M |  | | S |  | | M |  | | B |  |
| **B** |  | **A** |  |  | **D** |  |  | **D** |  |  | **C** |  | **D** | **C** | **A** | **D** |
| *M* | M |  | | S |  | | M |  | | B |  | F | F | F | F |
| **C** | **A** |  |  | **A** |  |  | **D** |  | **A** | **D** | **B** | **A** |  | **B** |  |  |
|  | S |  | | M |  | | B |  | F | F | F | F |  | M |  | |
| **D** |  |  | **A** |  | **B** | **A** | **C** | **B** |  | **C** |  |  | **B** |  |  | **B** |
|  | *B* |  | B |  | F | F | F | F |  | M |  | | S |  | | M |
| This fun moving pattern comes from the *Inside-Out-Weave*, where we add continuous feeder-weaver exchanges from the big loop. As you move through the feeder position, **F**, you pass 4 times, with 2-count gaps, the first and fourth of which are to the same juggler (as with all the *El* patterns). Feeder passes to small (**S**), middle (**M**), big (**B**), middle (**M**). You move into or out of the feeder position **F** on 4-count, and you move through the weave positions with three throws on 6-count gaps.  Mike, Mel, Jeff, and Nathan created this on September 8, 2022. As we say, like the spice, this pattern is good for inflammation!  **Metrics:**  **\***\*put arrows into the passing/moving table\*\* | | | | | | | | | | | | | | | | |

## **Extra-Club Moving 4-Person**

| **Extra Club Switch Sides Feed** *Windshield Wiper Version* | | | | | | | | |  | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Beat (1-count base; i.e. both-hands counting)** | | | | | | | | | | | | | |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |
| **A** | d-**B** |  | d-**C** |  | d-**D** |  | d-**C** |  |  |  | d-**C** |  |  |  |
| **B** |  | d-**A** |  | d-**s** | **½ P** |  |  |  | d-**C** |  | d-**s** | **½ P** |  |  |
| **C** |  |  |  | d-**A** |  |  |  | d-**B** |  | d-**A** |  | d-**D** |  | d-**A** |
| **D** | d-**s** | **½ P** |  |  |  | d-**A** |  | d-**s** | **½ P** |  |  |  | d-**C** |  |
| The standard *Switch Sides Feed* is an easy introduction to moving while passing. The extra club version here is a fun and spectacular pattern. The basic idea is that a feeder feeds three feedees, but the feedees on the end move straight across after every pass so that the middle feedee becomes the new feeder after each sweep.   * 13 clubs, 14 beat cycle (on 1-count base). * All passes are rights; **A** starts with 4. **B**, **C**, and **D** each start with 3 clubs and 2 in left. The sides are off kilter, with the **A-**side on left selves when the **C**-side is on rights, and vise versa. * Movers **B** and **D**, who go back and forth on 6 count (½ P indicates half pirouette under a right to left double self; d-s indicates a stationary double self); **A** and **C** are stationary, alternating as feeders. * **Metrics:** Alternating feeders (**A** and **C**) are stationary, with PBJ=5/14, all doubles, with 3 partners. Ends **B** and **D** switch back and forth, PBJ=2/14 (basically 6-count, aside from double selves), spin , with 2 partners, and distance 2 JU to get back and forth. Overall PBJ=7/28=¼. * Pattern by Luke Emery. | | | | | | | | | | | | | | |

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### **Extra Club Weaves**

Positions and movement as in the *standard weave* (see earlier), with starting configuration and passing lanes as shown here:

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#### **Standard Extra Club Weave**

Feeder **A** starts with 4 clubs and passes 2-count right doubles, windshield-wiper style, deep on the ends and loopy in the middle. The three weavers are offset (i.e. rights in time with feeder’s lefts), and respond in 6-count doubles back to **A**. PBJ=?. Performed by the Gentleman Jugglers (Mark Hayward, Matt Henry, \*\*, \*\*) at the first 47th annual Madfest (January, 1992); also performed by Peter Kaseman, Prof Mike, Mellonhead, and Nathan Nard \*\*which show\*\* in 2024. Variation: Do with lefts not rights!

#### **3-count/9-count Extra Club Weave**

Feeder **A** starts with 4 clubs and passes 3-count straight doubles, windshield-wiper style, deep on the ends and loopy in the middle. The three weavers are in sync with **A**, and respond in 9-count crossing doubles back to **A**. Works especially well with Nick Aickens as the feeder! It’s slower than the *standard extra-club weave*, but somehow more finicky, probably because we’re still not as sharp as we should be with lefts! PBJ=?

#### **Popcorn Weave**

Look back at the *Popcorn Feed,* imagine weaving the feedees, and you get the *Popcorn Weave.*  It’s a very challenging 2-extra-club (14-club) pattern, not for the faint of heart! Though the feed version is windshield wiper, in the weave feeder, **A** juggles 2-count doubles windshield wiper style to the three popcorning weavers. Weavers are doing all the same thing, a 6-count-popcorn, out of sync. Recall the right-hand mantra for this is **3-2-1,** triple self, double pass, single self, then repeat (all lefts are single selves). The challenge is that the weaver also needs to weave to the next spot in the time it takes to complete the **3-2-1. A** and **D** both start with 4 clubs. The rule is to launch your triple in response to the feeder's incoming double pass; note too that all passes are doubles, and they need to be fairly crispy doubles for this pattern to work! Difficulty…very high!! The *popcorn weave* dates to September, 1999, by Luke Emery and the MAJ. …metrics…

| **Unicycle Plus** A very fun and doable 1-extra club moving pattern for 4 with drop-backs. | | | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Juggler** | | **Beat** (1-count base) | | | | | | | | | | | | | | |
|  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** |
| **A** |  |  | t-**C** |  |  |  | t-**D** |  |  |  | t-**D** |  |  |  | t-**C** |  |
| **B** |  | d-**A** |  |  |  | d-**A** |  |  |  | d-**A** |  |  |  | d-**A** |  |  |
| **C** | d-**B** |  |  |  | d-**B** |  |  |  |  |  |  |  |  |  |  |  |
| **D** |  |  |  |  |  |  |  |  | d-**B** |  |  |  | d-**B** |  |  |  |
| **C** and **D** form the wheel (they move!), with 2 passes to the post **B** (on 4-count rights) followed by two phantoms while on the bottom of the wheel; moving steadily for a smooth ride! **A** (the seat) passes 4-count triples to both sides of the wheel. **B** faces the wheel and is doing 4-count back-drops to **A**; **A** and **C** are both stationary  **C** starts with 4; others with 3 clubs; **B** starts with left self; **A** and **D** start with right selves.  **Metrics:** J=4, CJ=3 ¼ (1 extra), cycle=16 beats on 1-count base. Passes doubles, triples, and dropbacks; **C** and **D** move but don’t spin; PBJ=¼ for **A** and **B** and ⅛ for **C** and **D**. Overall PBJ=3/16! Distance travelled by movers is circumference of the circle, whose diameter is perhaps of a JU, so about 2.2 JU (about 2 JU per loop).  pH=2 ⅓ (4 triples and 8 doubles). | | | | | | | | | | | | Starting configuration and passing lanes | | | | |

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| **14 Club Oogle Boogie** | |
| --- | --- |
| Positions/Passes      Pattern by Luke Emery, 2000 [?performed at Cascade of Stars, 2000 IJA?] | **1. C** and **D** start with 4 clubs each, and pass 3 times on 2-count then triple self. **A** and **B** start (1/2 beat after **C** and **D**) with 3 clubs each, do 3 passes, then move to position 2.  2. **A, B** do 3 passes, then triple self. **C, D** do 4 passes, then move to position 3.  3. **A, B** do 3 passes, then triple self. **C, D** do 3 passes, then move to position 4.  4. **A, B** do 4 passes, then move to position 5. **C, D** do 3 passes, then triple self.  All passes are double spin passes. Four passes are needed to transfer the extra clubs to the team that is not moving.  It's probably helpful to be comfortable with 7 club popcorn variations before learning this pattern! |
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|
| This has the same movement sequence as the standard *(Slow) Oogle Boogie*, but it makes for a spectacular pattern with 2 extra clubs, doubles passes (like 7 2-count), and some triple selves to support the moves. (Prior editions of the pattern book have jugglers rotating in the opposite direction; both versions work!) In principle, it's possible to do a regular fast *Oogle Boogie* instead of the slow version, but you need jugglers who are really comfortable moving while throwing self triples! Still a dream for the MAJ. | |

#### 

Here’s an extra club version of the standard clover, where each feeder doubles up passes to the feedees in order to reduce the speed of movement through the leaves.

| **Extra-Club Three Leaf Clover (slow)** | | **Juggler (1st half)** | | | |  | **Juggler (2nd half)** | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **A** | **B** | **C** | **D** | **A** | **B** | **C** | **D** |
| 28 beats, 1-count base  (i.e., both-hands counting)  13 clubs (i.e., 1 extra)  All passes right-hand straight doubles; **s** = double self; - = pause  These adjustments maintain timing since feeder rotates and feedees must be on lefts when feeder is on rights.  All jugglers do same local sequence, but out of phase:  1. Feed from right to left in doubles: pass once to the end, twice to the middle, twice to the other end.  2. Self double, pause.  3. Two right selves to move into the middle, then pass twice  4. Self double, pause  5. Two right selves to move out of the middle  6. Repeat! | **1** | **D** |  | **s** |  | **15** |  | **C** |  | **s** |
| **2** |  |  | **-** | **A** | **16** |  |  | **B** | **-** |
| **3** | **B** |  |  |  | **17** |  | **A** |  |  |
| **4** |  | **A** |  | **s** | **18** | **B** |  | **s** |  |
| **5** | **B** |  |  | **-** | **19** |  | **A** | **-** |  |
| **6** |  | **A** |  |  | **20** | **B** |  |  |  |
| **7** | **C** |  |  |  | **21** |  | **D** |  |  |
| **8** |  | **s** | **A** |  | **22** | **s** |  |  | **B** |
| **9** | **C** | **-** |  |  | **23** | **-** | **D** |  |  |
| **10** |  |  | **D** |  | **24** |  |  |  | **C** |
| **11** | **s** |  |  | **C** | **25** |  | **s** | **D** |  |
| **12** | **-** |  | **D** |  | **26** |  | **-** |  | **C** |
| **13** |  |  |  | **C** | **27** |  |  | **D** |  |
| **14** |  |  | **B** |  | **28** |  |  |  | **A** |
| Start and move path | **A** and **C** start with right; **B** and **D** start with left; **A** starts with 4.  **Pro tip:** Make the last feed throw deep and loopy to give enough room to the new feeder.  **Metrics: \*\*\***  Performed by…\*\*  Pattern by Luke Emery, 2001 | | | | | | | | | |

Here’s an extra club version of the standard clover but without the doubling up…a super challenging pattern to get the leads just right!

| **Hyper Clover** | |  | **Juggler** | | | |
| --- | --- | --- | --- | --- | --- | --- |
| **A** | **B** | **C** | **D** |
| 12 beats, 1-count base  (i.e., both-hands counting)  13 clubs (i.e., 1 extra)  Both hands counting, all right hands are double passes or double selves. **A** starts with left hand; **B** starts with pause, then left hand (for start, **B** can just start with right self); **C** starts with left hand; **D** starts with right hand and 4 clubs.  All passes right-hand straight doubles; **s** = double self; - = pause  These adjustments maintain timing since feeder rotates and feedees must be on lefts when feeder is on rights.  All jugglers do the same local sequence, but out of phase. As you start your feed, you receive from the last feeder but return fire to the middle person then end. It’s all in making good loopy leads! | | **1** |  | **-** |  | **A** |
| **2** | **B** |  | **s** |  |
| **3** |  | **A** | **-** | **s** |
| **4** | **C** |  |  | **-** |
| **5** |  | **s** | **D** |  |
| **6** | **s** | **-** |  | **C** |
| **7** | **-** |  | **B** |  |
| **8** |  | **A** |  | **s** |
| **9** | **B** |  | **s** | **-** |
| **10** |  | **D** | **-** |  |
| **11** | **s** |  |  | **C** |
| **12** | **-** | **s** | **D** |  |
| Start and move path | This was one of the first extra club clover variations we tried. (The first attempt was Prof Mike, Peter, Luke and Ilka from Luka Luka at a juggling convention.) Peter, Luke and Ilka are all fantastic club passers, but we discovered that this pattern was actually quite hard to do. That was the motivation to create the slower version described previously.  Pattern by Luke Emery, 2001.  **Metrics:**  Performed by…\*\* | | | | | |

### **2/3 with post + 1**

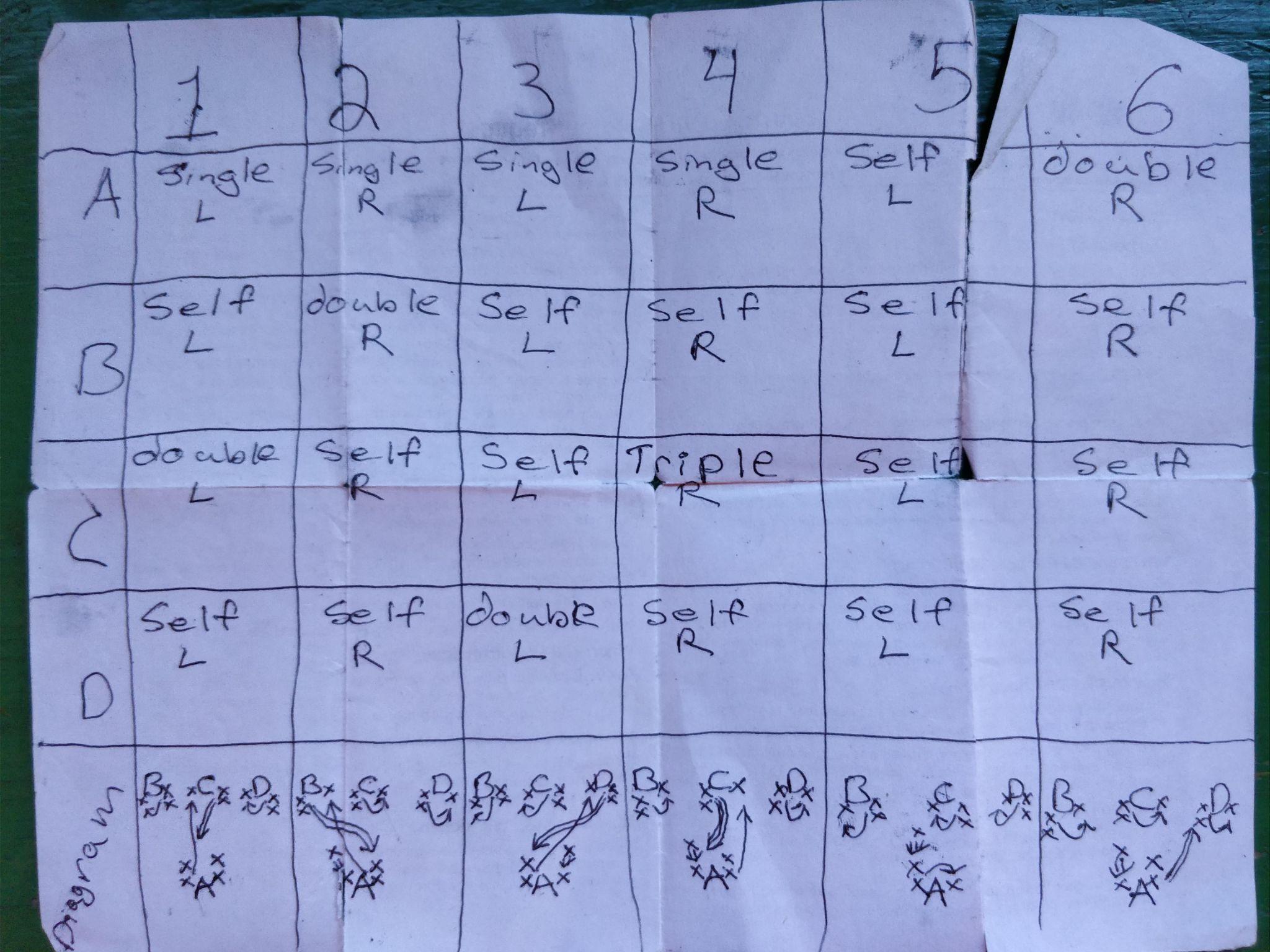
Recall the *2 with a post* (4-person moving), starting as in the figure.

**A**, **B**, and **C** are moving through the figure 8, passing to one, then the other then to the stationary post **D.** All passes are in sync and on whatever count the jugglers like. If we go now to 4-count (every-others), then there’s a nice opportunity to add an extra club. Think of **D** as feeding 4-count triples into the movers. Start **D** with 4 passing 4-count triples; movers start one right-hand beat later (or, perhaps, in sync but on a right-hand self). Movers pass singles to each other, but triples back to **D**. Pretty challenging to locate the triples appropriately, but pretty fun!

**Metrics: \*\***

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### **El Nino Plus (slow)**



### **El Nino Plus (fast)**



*El Nino Plus* patterns by Graham Paasch. \*\*Q. Graham, where are the transitions?\*\*

# 

# **Five Person Patterns**

Some classic configurations for jugglers **A, B, C, D,** and **E**.

| 2 on 3 (feed) | Apollo | Quincunx/Twister (set up) |
| --- | --- | --- |
| Wedgee | Circle/Star | Egg Beater (set up) |

## 

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## **Stationary 5-Person Patterns**

| **Apollos** The Apollo was invented by N.A.S.A. The Apollo juggling pattern was invented by the Gemini Jugglers in 1991. | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Original Apollo** | **Beat (2-count base)** | | | | |  |
|  |
| **Juggler** | **1** | **2** | **3** | **4** |  |
| **A** | **E** |  | **C** |  |  |
| **B** | **C** | **D** | **E** | **D** |  |
| **C** | **B** |  | **A** |  |
| **D** |  | **B** |  | **B** |  |
| **E** | **A** |  | **B** |  |  |
| * A great MAJ standard for beginning passers (the shape is reminiscent of the Apollo command module reentry vehicle!) * 15 clubs; layout of jugglers is also called a 1-1-3, for obvious reasons! * **A** and **B** face the heat shield **C,** **D**, and **E.** Usual start is right-handed. **B** is an ordinary feeder, while **A** alternates in 4-count to the ends. * A good exercise is to master passing with one assignment of jugglers to positions, and then to *rotate* positions, repeatedly, so that everyone gets to try every position! | | | | | |  |
| **Cockeyed Apollo** |  | **1** | **2** | **3** | **4** |  |
| Same layout,  but different *who-passes-to-whom*. | **A** | **E** |  | **C** |  |  |
| **B** | **C** | **D** | **E** | **D** |  |
| **C** | **A** |  | **B** |  |  |
| **D** |  | **B** |  | **B** |  |
| **E** | **B** |  | **A** |  |  |
| * Change the outside throws to be in a Y and the Apollo becomes *cockeyed*, so named because the middle feeder (**B**) has to throw and catch from opposite directions. Notice the switcheroo in the passing table for jugglers **C** and **E**. * PBJ= (same for both apollos) | | | | | |  |

### 

### **Patterns in a circle**

| **Star** A classic 5-person variation of the synchronized 4-person box | | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Juggler** | | | | |  |
| **Beat** | **A** | **B** | **C** | **D** | **E** |  |
| **Rights** | **D** | **E** | **A** | **B** | **C** |  |
| **Lefts** | **C** | **D** | **E** | **A** | **B** |  |
| * 15 clubs * Any beat of choice, all throws simultaneous * Right throws go to person to spots to your right; left throws to the one two spots to the left * On base count, cycle length is 1 for evens (e.g. 2-count) and is 2 for odds (e.g. 3 count) * PBJ=1/base-count, OJ=2. | | | | | |  |
|
|  |
| Collisions are certainly a possibility with this classic pattern, and so the need for precise timing makes it a bit difficult for beginning passers, even on a slow beat. (You’re also not passing to the same person you receive from.) When well timed, your right throws will pass just behind the right throw of the juggler on your right, so keep an eye out! By the same token, any left throws pass immediately behind the left throw of the juggler on your left. As with the synchronous 4-person box, having a wider ZOC reduces collisions.  All counts are fun; the MAJ has a love-hate relationship with the 1-count star; it was one of those failed patterns in the Mad-5 routine when they competed for the IJA teams competition in 1999! But remember the 2-count version we did with Laptop Dave helmeted in the middle, where we ended with a cheer by targeting Dave! \*\*CHECK WITH MEL…MAYBE HEX NOT STAR\*\* [fun with LED star at the 2025 homecoming parade\*\* | | | | | | |  |

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| **Feast (for 5)** Everyone feeds everyone else (clockwise from above version) | | | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Juggler** | | | | | |  |
| **Beat** | **A** | **B** | **C** | **D** | **E** |  |  |
| **1** | **B** | **A** | **E** |  | **C** |  |
| **2** | **C** |  | **A** | **E** | **D** |  |
| **3** | **D** | **C** | **B** | **A** |  |  |
| **4** | **E** | **D** |  | **B** | **A** |  |
| **5** |  | **E** | **D** | **C** | **B** |  |
| * Pass sequentially around the circle, including yourself in the count. * Any base count of choice; 3 and 4 count are pleasant; 2-count requires some good passers and good timing. 1-count is a dream! * J=5, cycle length=5 on base count; PBJ=, e.g., on 3-count; on a 4-count, OJ=4, CJ=3.   This is a classic generalization of a *rotating feed* (which itself we rarely do because it’s harder to remember and less fun. It’s not even documented in the book!) MAJ have been juggling feasts since at least 1992; the origin is unknown to us at writing. Variations include: **Picnic** Start by practicing a 3-count feast. In the *picnic*, you complete one cycle throwing right-right or left-left crossing passes, then you switch on the next cycle (after doing your self beat) to do a round of straight passes (right-left or left-right). To set up, note that each pair of passers must include one *straighter* and one *crosser*. Picnic leads to all kinds of interesting Jim’s jams, including long sequences of only left throws or only right throws. Just remember, pass back the club you catch! [*Homework: figure out the cycle length!]* **Feast-Star** Here is an excellent brain game (and a favorite among MAJ-ers). Interleave the *feast* with the *star* by passing one feast beat, followed by one star beat, followed by the second feast beat, then then second star beat, and so on. This doubles the cycle length and provides for endless fun as people get confused about where they are in that cycle! E.g., for the popular 4-count, the cycle is 10 4-count beats, with PBJ equal 0.225. Because you have two partners in a 3-count star, the 3-count *feast-star* is even more difficult. Of late (August 2025), Nick Aikens and Steve Clipson have had us doing a *Feast-Feast-Star* or a *Feast-Feast,* where the two feasts are going in opposite directions!! | | | | | | | |  |

| **Selfless Star** | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat (3-count base)** | | | | We have been doing this pattern since at least 1992 and are unsure of its origins.  **Metrics:** J=5, PBJ=⅓, OJ=4, CJ=3. |
| **Juggler** | **1** | **2** | **3** | **4** |
| **A** | **B** | **C** | **D** | **E** |
| **B** | **C** | **D** | **E** | **A** |
| **C** | **D** | **E** | **A** | **B** |
| **D** | **E** | **A** | **B** | **C** |
| **E** | **A** | **B** | **C** | **D** |
| This variation is somewhere in between a *feast* and a *star.* You do not pass to the same person you receive from, and the passes to neighbors are at a pretty sharp angle, making this pattern difficult even on the 3-count. It’s possible but even harder on 2-count or 1-count. Passes move around the circle like in a *feast,* though unlike a *feast* you do not count yourself (hence *selfless*!). | | | | | | |

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| **Stationary Isla Vista Weaves** A non-MAJ non weave! | | | | | | | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| In these circle patterns, a 2-count feed (grey) travels around the circle. No juggler passes to either of their adjacent neighbors; all jugglers follow the same sequence, but out of sync. | | | | | | | | | | | |  |
| **2666 version** | | **Beat (2-count base; i.e. right-hand counting)** | | | | | | | | | |  |
|  |  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |  |
| **A** | **D** | **C** |  |  | **C** |  |  | **D** |  |  |  |
| **B** |  |  | **E** | **D** |  |  | **D** |  |  | **E** |  |
| **C** |  | **A** |  |  | **A** | **E** |  |  | **E** |  |  |
| **D** | **A** |  |  | **B** |  |  | **B** | **A** |  |  |
| **E** |  |  | **B** |  |  | **C** |  |  | **C** | **B** |  |
| **1333 version:** Same passing table as above, but on 1-count base (i.e. both hands counting); pretty challenging! | | | | | | | | | | |  |

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| **2454 Isla Vista Weave** For those seeking to challenge their memory! | | | | | | | | | | |  | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Metrics:** J=5, OJ=2, CJ=3, PBJ=4/15, cycle length=30. | | | | | | | | | | |  |
|  | **Beat (1-count base; i.e. both-hands counting) (½ cycle)** | | | | | | | | | | | | | | |  |
|  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |  |
| **A** | **D** |  | **C** |  |  |  | **C** |  |  |  |  | **D** |  |  |  |  |
| **B** |  |  |  | **E** |  | **D** |  |  |  | **D** |  |  |  |  | **E** |  |
| **C** |  |  | **A** |  |  |  | **A** |  | **E** |  |  |  | **E** |  |  |  |
| **D** | **A** |  |  |  |  | **B** |  |  |  | **B** |  | **A** |  |  |  |
| **E** |  |  |  | **B** |  |  |  |  | **C** |  |  |  | **C** |  | **B** |  |

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Here are some fun 5 person stationary patterns with 2 feeders and 3 feedees that work both-hand passing. Originally (and most easily) these are set up in opposing lines (standard positions; 2 v 3), but the more uncomfortable wedgee positions are a good challenge (They used to work well when we juggled on chairs in 3650 Humanities!) Chocolate feeds are great 2nd-stage (i.e., not the easiest) stationary patterns, and they are especially good for getting your timing locked in without worrying about moving and leads.

| **Chocolate Feeds** | | | | | **Standard formation** | | | | | **Wedgee formation!** | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Chocolate bar 3-count feed: aka Chocolate Box** 2 feeders share a 1-count feed | | | | | | | | | | | | | |  |
|  | **Base beat (1-count)** | | | | | | | | | | | |  |  |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |  |
| **A** | **C** | **D** |  |  | **D** | **E** |  |  | **E** | **C** |  |  |  |
| **B** |  |  | **E** | **C** |  |  | **C** | **D** |  |  | **D** | **E** |  |
| **C** | **A** |  |  | **B** |  |  | **B** |  |  | **A** |  |  |
| **D** |  | **A** |  |  | **A** |  |  | **B** |  |  | **B** |  |  |
| **E** |  |  | **B** |  |  | **A** |  |  | **A** |  |  | **B** |  |
| * 15 clubs, right-hand start (standard) * Feedees in 3-count, twice in a row to each feeder, in steady state * Feeders do chocolate bar, with a nice overlapping pattern to feedees * See discussion and nice animation by Aidan Burns at <https://www.juggle.org/passing-post-feeding-on-chocolate-bars/> * Pattern by Steve Otteson and MAJ * Performed by Mad-5 at ‘97 Madfest, and elsewhere * PBJ=; OJ=(3x2+2\*3)/5=2.4. | | | | | | | | | | | | | |  |
| **Double chocolate double 3-count feed** | | | | | | | | | | | | | |  |
|  | **1** | **2** | **3** | **4** | **5** | **6** | **(1-count base)** | | | | | | |  |
| **A** | **C** | **C** | **D** | **C** | **C** | **D** | * Feedees on 3/2 count * Feeders on 1-count (i.e. double chocolate!) * Pattern by Steve Otteson and MAJ * Performed by Mad5+1 at ‘99 Madfest * PBJ= * J=5, OJ=2, CJ=3. | | | | | | |  |
| **B** | **E** | **D** | **E** | **E** | **D** | **E** |  |
| **C** | **A** | **A** |  | **B** | **B** |  |  |
| **D** |  | **B** | **A** |  | **B** | **A** |  |
| **E** | **B** |  | **B** | **B** |  | **B** |  |
|  | | | | | | | | | | | | | |  |
| **Semi-Sweet Chocolate 3-count feed (aka *The New One*)** | | | | | | | | | | | | | |  |
|  | **1** | **2** | **3** | **4** | **5** | **6** | **1-count base** | | | | | | |  |
| **A** | **E** | **C** |  | **E** | **D** |  | * Feeders in 3/2 count * Middle feedee doing simple 3-count alternating to feeders; corners alternate 3-count:3/2-count * Pattern by Prof Mike. * PBJ= * OJ=2 | | | | | | |  |
| **B** |  | **D** | **C** |  | **E** | **C** |  |
| **C** |  | **A** | **B** |  |  | **B** |  |
| **D** |  | **B** |  |  | **A** |  |  |
| **E** | **A** |  |  | **A** | **B** |  |  |
| **Yet another variation** | | | | | | | | | | | | | |  |
|  | **1** | **2** | **3** | **4** | **5** | **6** | **1-count base** | | | | | | |  |
| **A** | **C** |  | **E** |  | **D** |  | * Feeders in 2-count (one left and one right) * Feedees in 3-count * Pattern by Steve Otteson and MAJ * PBJ= * OJ=2 | | | | | | |  |
| **B** |  | **D** |  | **C** |  | **E** |  |
| **C** | **A** |  |  | **B** |  |  |  |
| **D** |  | **B** |  |  | **A** |  |  |
| **E** |  |  | **A** |  |  | **B** |  |

## **Extra Club Stationary 5 Person Patterns**

There are lots of extra club variations of the patterns introduced earlier, but the MAJ go-to most popular stationary 5-person extra club pattern over the last few years is this 5-count star.

| **Extra club 5-count star** | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat (1-count base); ½ cycle** | | | | |
| **Juggler** | **1** | **2** | **3** | **4** | **5** |
| **I** | d-**II** |  |  |  |  |
| **II** |  | d-**III** |  |  |  |
| **III** |  |  | d-**IV** |  |  |
| **IV** |  |  |  | d-**V** |  |
| **V** |  |  |  |  | d-**I** |
| Each juggler passes to one other juggler (2 spots to right) and receives from a different one.  All passes are crossing (i.e., *left-left* or *right-right*) as 5-count double throws, and jugglers hands are in sync. Notice we rename jugglers using numbers here, since we usually identify the jugglers with numbers as we do the pattern. In fact, for timing we often will call out our number as we throw. It can be seen as a 5-person version of the 3-person extra club 3-count triangle.  A full cycle lasts 10 1-count beats in order for each juggler to pass both a right-hand pass and a left-hand pass.  This is a great pattern for 5 jugglers who are comfortable passing doubles from either hand.  jugglers; cycle length=10 beats; , OJ=2.  **Variations**: See the next two patterns, which either add a club or add some single passes  **Origin:** Unknown to us, but probably not Madison. | | | | | | |

| **Two extra club 5/2-count star [also PSPSS star]** | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat (1-count base); ½ cycle** | | | | |
| **Juggler** | **1** | **2** | **3** | **4** | **5** |
| **I** | d-**II** |  | d-**II** |  |  |
| **II** |  | d-**III** |  | d-**III** |  |
| **III** |  |  | d-**IV** |  | d-**IV** |
| **IV** | d-**V** |  |  | d-**V** |  |
| **V** |  | d-**I** |  |  | d-**I** |
| Same passing style as previous pattern. Each juggler passes to one other juggler (2 spots to right) and receives from a different one. All passes are crossing (i.e., *left-left* or *right-right*) as 5-count double throws, and jugglers hands are in sync. A full cycle lasts 10 1-count beats in order for each juggler to pass both a right-hand pass and a left-hand pass.  This one is an order of magnitude more difficult than the *5-count extra club star,* but it works well with the right team. We find the spacing benefits from having a short gap between your passes within the *pass-self-pass* sequences; i.e. throw the first one a titch late and second a titch early!  **Metrics:** jugglers; cycle length=10 beats; , OJ=2.  Origin: ? (Luke?)  **Variations:** Any *S* can theoretically be converted to a *P* by adding a club, but it makes things super hard! | | | | | | |

This variation goes back to one extra club, but adds a bunch of extra single passes.

| **Extra club 5-count star with crispy extra passes** | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat (1-count base); ½ cycle** | | | | |
| **Juggler** | **1** | **2** | **3** | **4** | **5** |
| **I** | d-**II** | **V** | **II** |  |  |
| **II** |  | d-**III** | **I** | **III** |  |
| **III** |  |  | d-**IV** | **II** | **IV** |
| **IV** | **V** |  |  | d-**V** | **III** |
| **V** | **IV** | **I** |  |  | d-**I** |
| Notice how many selves are happening in the *5-count extra-club star*. This variation soaks some of those selves with zippy single-spin (straight) throws to an appropriate partner. Each single-pass event happens almost orthogonal to the same-time double, which minimizes collision potential. It leads to the neat per-juggler sequence of double-single-single, with the first and third passes going to the same person. (Make the doubles loopy and the singles crispy!)  jugglers; cycle length=10 beats; , OJ=2, THJ=4/3.  Prof Mike suggested the singles, and others (probably Nathan and Steve), realized if you pack singles you get this nice *double-single-single* sequence. Recent addition (2024). | | | | | | |

In this variation, each juggler passes in a 4-count across and to the right. This pattern has only right hand passes and right to left double selves.

| **Extra club 4-count star** | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Beat, 1-count base (i.e., both hands counting)** | | | | | |
| **Juggler** | **1** | **2** | **3** | **4** | **5** |
| **A** | d-**D** |  | d-**self** | **pause** |  |
| **B** | **pause** |  | d-**E** |  | d-**self** |
| **C** |  | **d-self** | **pause** |  | d-**A** |
| **D** |  | d-**B** |  | d-**self** | **pause** |
| **E** | d-**self** | **pause** |  | d-**C** |  |
| **A** starts with 4; **A, E** start with right; **B, C, D** start with left (**B** starts with a pause, so **B** actually starts with a right on beat 2). All passes straight doubles.  **Metrics:** J=5, CJ=3.2, PBJ=1/5, cycle length=5, OJ=2, THJ=2. | | | | | | |

## 

| **Apollo Plus** | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Beat (2-count base)** | | | | |  |
| **Juggler** | **1** | **2** | **3** | **4** |  |
| **A** | **E** | t-**D** | **C** | t-**D** |  |
| **B** | **C** | **D** | **E** | **D** |  |
| **C** | **B** |  | **A** |  |
| **D** | t-**A** | **B** | t-**A** | **B** |  |
| **E** | **A** |  | **B** |  |  |
| Take the standard *Apollo*, and add triple-spin passing between **A** and **D**! **D** starts with 4.  Metrics: J=5, CJ=3.2, PBJ=16/[(4)(2)(5)]=0.4.  Variation**:** It’s conceivable but super hard to do the *Cockeyed Apollo* version. \*\*MODIFY FIGURE TO SHOW TRIPLE\*\* **Apollo Plus Plus** Add another club to the inner feed (all those passes are doubles) so it is a 2-count extra club feed  Metrics: J=5, CJ=3.4, PBJ= [CONFIRM ON C AND E ROLES] | | | | | |  |

### **2 v 3 with extra**

| **Overlapping 10-club feeds** | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Beat (1-count base)** | | | | |  |
| **Juggler** | **1** | **2** | **3** | **4** |  |
| **A** | **C** |  | **D** |  |  |
| **B** | **D** |  | **E** |  |  |
| **C** |  | **A** |  |  |
| **D** |  | **B** |  | **A** |  |
| **E** |  |  |  | **B** |  |
| Feeders **A** and **B** start with 4, each one juggles in 2-count. Others start with 3 clubs, either with 2 in left hand and self or just delay and respond to feeders; the ends **C** and **E** do 4 count, while **D** is the anchor, and connects the two feeds in 2-count. This is one of the easiest 2-extra club patterns; the lines are offset like a call-response with double throws. Perfecting this pattern sets you up for more complex patterns, like the *Mangled Squirrel* which you get by doing continual change sides!  **Metrics:** J=5, CJ=3.4 (2 extra), PBJ= [3x2+2x1]/5=8/5=1.6, THJ=2 | | | | | |  |

### 

| **Up-Up-Over-5** | | | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Beat (1-count base)** | | | | | | |  |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** |  |
| **A** | **D** |  |  | **C** |  |  |  |
| **B** | **E** |  |  | **D** |  |  |  |
| **C** | **↑** |  | **A** |  | **↑** |  |
| **D** |  | **A** |  |  | **B** |  |  |
| **E** |  | **↑** |  | **↑** |  | **B** |  |
| Refer to *Up-Up-Over for 3* jugglers; recall this one involves simultaneous double throws from both hands. Expand from 2 facing 1 to 3 facing 2 jugglers. Now only the outside jugglers **C** and **D** do Up-Up-Over; the other three are Over-only feeders. Remember, these are simultaneous (right and left) double throws. **↑** is a simultaneous double self (i.e. both hands double self, like in synchronous 4-clubs). All passes are synchronous double throws. **A**, **B, and C** start with 4 clubs each; **D** and **E** start with 2 clubs each.  **Metrics:** J=5, CJ=3.2 (1 extra), THJ=2, PBJ=[3x2+2x1]x2/6=1.67, counting each passing beat as 2 considering clubs are passed in pairs! | | | | | | | |  |

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### **Extra Clubs Feast-Like**

Following are some gems by Luke Emery from 1999. They take an awful lot of concentration and are beyond most MAJ groupings, but they are classic extra-club stationary patterns.

| **Extra Club Rotating Feed** Any feed or feast can be done with an extra club by replacing single passes with doubles and following every feedee pass and every feeder cycle with a self double to restore the timing. A right to left self double then switches left and rights. Version shown is clockwise (from above). | | | | | |  | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Juggler** | | | | | | **Juggler** | | | | | |
| **Beat** | **A** | **B** | **C** | **D** | **E** | **Beat** | **A** | **B** | **C** | **D** | **E** |
| **1** | **C** |  |  |  | **self** | **14** | **self** | **D** |  |  |  |
| **2** |  | **self** | **A** |  | **pause** | **15** | **pause** |  |  | **C** |  |
| **3** | **D** | **pause** |  |  |  | **16** |  | **self** | **E** |  |  |
| **4** |  |  | **self** | **A** |  | **17** |  | **pause** |  | **self** | **C** |
| **5** | **E** |  | **pause** |  |  | **18** |  |  | **A** | **pause** |  |
| **6** |  |  |  | **self** | **B** | **19** | **C** |  |  |  | **self** |
| **7** | **self** | **E** |  | **pause** |  | **20** |  |  | **B** |  | **pause** |
| **8** | **pause** |  |  |  | **C** | **21** | **self** | **D** |  |  |  |
| **9** |  | **self** | **E** |  |  | **22** | **pause** |  | **self** | **B** |  |
| **10** |  | **pause** |  |  | **D** | **23** |  | **E** | **pause** |  |  |
| **11** |  |  | **self** | **A** |  | **24** |  |  |  | **self** | **B** |
| **12** | **D** |  | **pause** |  | **self** | **25** |  | **A** |  | **pause** |  |
| **13** |  |  |  | **B** | **pause** |  | | | | | |
| Both-hands counting (i.e., 1-count base). All passes are doubles, and also each noted **self** is a double, which followed by **pause** adjusts the hands. (Ordinary single selves are blank, per usual.) **A** starts with 4; **A** and **E** start with rights; **B**, **C**, and **D** each start with their left hand. The steady state right hand sequence is: feed 3 passes, double self, then self-pass-double-self, twice, repeat.  **Metrics**: J=5, CJ=3.2, PBJ=1/5; cycle length=25 on 1-count base. OJ=4 [in-degree=out-degree=3], THJ=2. | | | | | | | | | | | |

| **Extra Clubs Feast, I** The feast is an extension to the 5 juggler *Feast* and the 5 juggler *Extra Club Rotating Feed*. The feeders alternate straight across right hand triples and doubles to keep the timing working.  Wow. Remember, if it were easy, then anyone could do it! | |  | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| * Both hands counting * All right hands are double or triple passes * **D** and **E** start with 4 clubs and right hands * On the very start only, **A** skips the pause and starts with a d-**C** on 1 with right hand * **B** and **C** start with left hand |  | **Beat (1-count base)** | | | | |
| **Juggler** | **1** | **2** | **3** | **4** | **5** |
| **A** | pause |  | d-**E** |  | t-**C** |
| **B** |  | t-**D** | pause |  | d-**A** |
| **C** |  | d-**B** |  | **t**-**E** | pause |
| **D** | t-**A** | pause |  | d-**C** |  |
| **E** | d-**D** |  | t-**B** | pause |  |
| **Metrics**: J=5, CJ=3.4, PBJ=⅖, OJ=4. This is a case where the `other jugglers` OJ metrics is an oversimplification, since it ignores direction when counting degree in the who-passes-to-whom graph. Each juggler passes to two and receives from another two.  cycle length=5 on 1-count base. THJ=2.5 (i.e. half doubles and half triples!). | | | | | | |

If that is just too crazy, then you can do the same basic pattern idea more slowly.

| Beat  (1-count) | Juggler | | | | | **Extra Clubs Feast, II** |
| --- | --- | --- | --- | --- | --- | --- |
| **A** | **B** | **C** | **D** | **E** |  |
| **1** | d-**C** |  |  |  | d-**D** |
| **2** |  | d-**self** | d-**A** | d-**E** |  |
| **3** | d**-C** | pause |  |  | d-**D** |
| **4** |  |  | d-**B** | d-**A** |  |
| **5** | d**-D** | d-**C** |  |  | d-**self** |
| **6** |  |  | d-**B** | d-**A** | pause | * Both hands counting * All right hands are double passes or double selves; lefts are single selves. * **A** and **E** start with 4 clubs and right hands * **B,C** and **D** start with left hand   Interestingly, this is a stationary version of the *Mangled Squirrel,* which we arrived at by adding change sides to a *2 on 3 feed!* |
| **7** | d**-E** | d-**D** |  |  |  |
| **8** |  |  | d-**self** | d-**B** | d-**A** |
| **9** | d**-E** | d-**D** | pause |  |  |
| **10** |  |  |  | d-**C** | d-**B** |
| **11** | d**-self** | d-**E** | d-**D** |  |  |
| **12** | pause |  |  | d-**C** | d-**B** |
| **13** |  | d-**A** | d-**E** |  |  |
| **14** | d**-B** |  |  | d-**self** | d-**C** |
| **15** |  | d-**A** | d-**E** | pause |  |
| **Metrics:** J=5, CJ=3.4, PBJ=⅖, OJ=4 (in-degree 2, out-degree 2) , THJ=2. | | | | | | |

#### 

| **Extra Clubs Feast, III** Here's a version that might be easier than **I** or **II**. | |  | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| * Both hands counting * All juggler start with the right * All right hands are double or triple passes * **D** and **C** start with 4 clubs and right hands * On the very start only, **E** does a pause on 1 and a left self on 2 * **A** and **B** start with left hand |  | **Beat (1-count base)** | | | | |
| **Juggler** | **1** | **2** | **3** | **4** | **5** |
| **A** |  | t-**D** | pause |  | d-**D** |
| **B** |  | d-**E** |  | t-**E** | pause |
| **C** | t-**A** | pause |  | d-**A** |  |
| **D** | d-**B** |  | t-**B** | pause |  |
| **E** | pause |  | d-**C** |  | t-**C** |
| **Metrics**: J=5, CJ=3.4, PBJ=⅖, OJ=2,cycle length=5 on 1-count base. THJ=2.5. | | | | | | |

#### **Extra-club chocolate feed**

Aidan Quinn worked out an extra club variation of the *Chocolate Bar 3-count Feed*. Basically the feeders share an extra club ultimate feed, alternating two passes as chocolate bar. Feeders pass straight and feedees pass cross. This pattern is also called the Chocolate Box. See <https://www.juggle.org/passing-post-feeding-on-chocolate-bars/>

**Metrics:** \*\*PBJ=?; OJ=?; THJ=?

A version with 2 extra clubs should be theoretically possible, with all passes straight doubles.

### **Extra challenging extra-club stars**

| **Triply Star, I** | |  | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| * Right hand counting * **A** starts with 4   If you want to get crazy, note that each juggler has 2 right selves in a row. That's exactly enough time for each juggler to do a triple self with a pirouette and stay in time.  If you need to mellow it out, you can remove all the single passes and just pass a triple around in 10-count. |  | **Beat (2-count base)** | | | | |
| **Juggler** | **1** | **2** | **3** | **4** | **5** |
| **A** | t-**D** |  |  | **C** | **D** |
| **B** | **D** | **E** | t-**E** |  |  |
| **C** |  |  | **E** | **A** | t-**A** |
| **D** | **B** | t-**B** |  |  | **A** |
| **E** |  | **B** | **C** | t-**C** |  |
| **Metrics**: J=5, PBJ=3/10, OJ=2, THJ=5/3, CJ=3.2; by Luke Emery | | | | | | |

Here's a variation with triple selves instead of triple passes.

| **Triply Star, II** | |  | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| * Right hand counting * **C** starts with 4   Luke: There could be many more interesting star variations based on siteswaps that are passed from one star point to the next. I've seen a few demonstrated at European conventions. |  | **Beat (2-count base)** | | | | |
| **Juggler** | **1** | **2** | **3** | **4** | **5** |
| **A** | **t-self** | **D** |  | **C** | **D** |
| **B** | **D** | **E** | **t-self** | **E** |  |
| **C** | **A** |  | **E** | **A** | **t-self** |
| **D** | **B** | **t-self** | **B** |  | **A** |
| **E** |  | **B** | **C** | **t-self** | **C** |
| **Metrics**: J=5, PBJ=3/10, OJ=2, THJ=1, CJ=3.2; by Luke Emery | | | | | | |

| **20 Club Star** One of the great 5-person 5-extra club patterns!  This classic pattern is a star where every juggler starts with 4 clubs and in sync does 2-count doubles to the juggler across and to the right. It's a good study in timing. Passes cross just behind those of the person on your right. | |  | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| * Right hand counting * All start with 4, rights | **Juggler** | **A** | **B** | **C** | **D** | **E** |
| **Beat: 1** | **D** | **E** | **A** | **B** | **C** |
| **Metrics**: J=5, PBJ=1/2, OJ=1, THJ=2, CJ=4. Cycle length 1 (on 2-count base). Origin unknown | | | | | | |

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## **Moving 5 Person Patterns**

### **Weaves**

| **Dr. Inside Dr. Outside Weave****Apollo Weave** | | **Juggler** | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Standard Formation | Apollo Formation | **Base beat** | **A** | **B** | **C** | **D** | **E** |
|  | | **Start position** | | |
| **1** | **9** | **5** |
| **1** | **C1** |  | **A** |  |  |
| **2** |  | **D10** |  | **B** |  |
| **3** | **E7** |  |  |  | **A** |
| **4** |  | **C4** | **B** |  |  |
| This modifies the 4-person *Standard Weave* by dividing the feeder into two: **A** passes to the outside positions and **B** passes to the middle, with both feeders on 4-count in the standard version. Weavers **C**, **D**, and **E** proceed as in *Standard Weave.* Right-handed 2-count base is standard.Positions: | | **5** | **D1** |  |  | **A** |  |
| **6** |  | **E10** |  |  | **B** |
| **7** | **C7** |  | **A** |  |  |
| **8** |  | **D4** |  | **B** |  |
| **9** | **E1** |  |  |  | **A** |
| **10** |  | **C10** | **B** |  |  |
| **11** | **D7** |  |  | **A** |  |
| **12** |  | **E4** |  |  | **B** |
| **13=1** | | | | | |
| This pattern is a necessary warm up pattern for the *Twister Weave*. | | | | | | | |
| **Variations:** There are tons of variations of this two-feeder weave as in the *standard weave*. For starters, you can change the direction (so-called *inverted weave*), which has forward on the end and back in the middle as the basic rule. After passing on an end, be sure to wait for the middle pass before you move into the middle, else you’ll get hit!. Whether standard or inverted, there are all sorts of timing variations that amount to modifying the base beat; these all involve a 12-base-beat cycle, but could be slower or faster (or weirder!) than the standard. For example, 3-count base has feeders splitting a 3-count (so each is on 6 count) and each weaver on a 9-count–very pleasant for sure, but 9 is fairly slow and some of us have trouble counting that high! We often have **A** and **B** both on 3-count, which then leads to an interesting alternating 4-count/5-count cycle for the weavers. There are two ways to do that; we usually prefer the feeders start pass-self-pass-pass, and so that makes a 5 count after you pass on the end and a 4-count off the middle. (We call that a *4-5 weave*.) Faster bases are basicallyimpossiblefor mortal jugglers. One that is feasible is the 1-2-on-a-4-count base, where the feeders split chocolate-bar (pass-pass-self-self); more pleasant is 1-3-on-a-5-count base, which nicely balances hands. Also, 1-3-5-on-a-5-count makes the weavers all do 5-count, and the feeders sort out a split of that timing; e.g. the *PSPSP* weave has feeders alternate 3-count and 4-count so movers are on (the notation means one feeder passes on each P beat and both self on the S beat).  **Metrics:** PBJ = ⅙ per weaver, ¼ for each feeder; mean=⅕.. No rotation (spin=0). Thinking of the shape as a lemniscate, motion=perimeter= JU , assuming feedees start each 1/ JU apart (i.e. a bit wider than for a stationary feed; width of weaver line = JU; remember JU = juggling unit = distance separating typical passers!). OJ=2 for feedees and 3 for each feeder, mean=.  **Origin:** Both the *Standard Weave* and these 2-feeder variations are old, pre-MAJ patterns The MAJ have been weaving since 1992, or earlier! Historically (thanks Tom Pomraning), juggler **A** was also called Glen Davis (Mr. Outside) and **B** is called Doc Blanchard (Mr. Inside), college football players from the 1940s with the same nicknames! Recently Maya \*\* suggested and we realized that Dr. Inside/Dr. Outside are better monikers. | | | | | | | |
|

| **Twister Weave** | Animation  (http://juggloid.com/editor/?s=sU0PC0).  Watch SJRI  (https://www.youtube.com/watch?v=hmP4aZVFGJc) |
| --- | --- |
| The original *Twister Weave* is one of the great MAJ discoveries. It has the exact same passing table as above in the *Dr. Inside Dr. Outside Weave*. However, Dr. Inside (**B**) and Dr. Outside (**A**) are on opposite sides of the weavers, so the weavers (on 6-count) turn around after every pass. When we first tried this on Library Mall (August 24, 1992), it seemed incredibly hard, probably because we hadn't yet mastered moving patterns involving rotations (good self throws make the difference; and there’s usually both an easy and a hard turn direction!) *Oogle Boogies* and other *weaves* had moves but no rotations; *Egg Beaters* had 90 degree rotations; *Quincunx* had a full rotation but it was very slow. *Twister Weave* is a durable and easy to remember pattern. MAJ often juggle it in parades, shows, and whenever 5 like-minded jugglers show up to practice! Performed by Mad-5 at 1996 Madfest, and many times by many jugglers since then!  ***Double-Time Twister*** Feeders on 2-count, passing twice in a row to each weaver; weavers pass 2-rights out of every 3, with one right-hand self (i.e. 4-count) to turn.  Base pattern by Prof. Mike, variations by MAJ. |
|
| **Other variations:** All the timing variations as noted for *Dr. Inside Dr. Outside* are possible. A comfortable slow one is weavers on 9-count, feeders on 6-count; a faster one is feeders on 3-count and weavers alternative 4-5-count. MAJ records show some very challenging variations that are reserved for the best jugglers warmed up and in the best mood! There’s the *fast twister,* with weavers on 4-count and feeders each 8/3 count (PSPSPSSS and PSSSPSPSS), the *ultra-twister,* with weavers alternating 4-3-count and feeders on 7/3-count (PSSPSPSS and PSPSPSS), and the *hyper-twister,* with weavers on 3-count and feeders on out-of sync 2-count! This is a master-class pattern, owing to 180 degree turns after every pass and on 3-count. Good leads are essential!  **Metrics**: All the same as *Dr Inside Dr Outside Weave*, except with spin 4 per weaver. Distance=\*\*, OJ=2, CJ=3. Double time has PBJ=⅖. \*\*on faster variations | |

#### 

| **Involuted Twister** | | | | | | | | | | | **Tree Twister** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Base beat (3-count standard); ½ cycle** | | | | | | | | | | The *involuted twister* came about by doing a continuous feeder/weaver swap within a standard *twister weave.* The 2-count base of the twister is a bit too fast for standard, but 3-count is nice! The *Tree* variation comes by adding all those **grey** passes (table), while doing the same movement. Passes down the center go back and forth like branches, hence the name! (4-count is an ideal start for the tree.) | |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| **A** | **E** | **C** | **B** | **D** |  | **E** | **C** | **B** | **D** |  |
| **B** |  | **D** | **A** | **E** | **C** |  | **D** | **A** | **E** | **C** |
| **C** | **D** | **A** | **E** |  | **B** | **D** | **A** | **E** |  | **B** |
| **D** | **C** | **B** |  | **A** | **E** | **C** | **B** |  | **A** | **E** |
| **E** | **A** |  | **C** | **B** | **D** | **A** |  | **C** | **B** | **D** |
|  | | | | | | | | | | | | Set up like a *twister weave*, with **D** facing **B** and **C** and **E** both facing **A.** |
| **Metrics**: J=5, OJ=2 (involuted), OJ=4 (tree), CJ=3, full cycle=20 (local passing cycle=5), PBJ=1/15 (3-cnt involuted), 4/15 (3-cnt tree), 4/20=⅕ (4-cnt tree); distance = \*\*; spin= \*\*  *Involuted Twister* by Prof Mike and Mel, August, 2022. The *Tree Twister* was born on 10/16/25, juggled on 4-count by Mike, Nathan, Mel, Mark and Carly at the church. | | | | | | | | | | | | |

| **Ivy Pi Weave** Here's a fun variation on *2/3*. We figured it out by adding one and then a second feeder to fill the gap in that 3-person pattern. Then we noticed you could have everyone move through all the positions. |  | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat, base count (4-count standard)** | | | | |
|  | **1** | **2** | **3** | **4** | **5** |
| **A** | **D** | **C** | **D** | **C** |  |
| **B** | **E** | **D** |  | **E** | **D** |
| **C** |  | **A** | **E** | **A** | **E** |
| **D** | **A** | **B** | **A** |  | **B** |
| **E** | **B** |  | **C** | **B** | **C** |
| **Metrics**: J=5, Full cycle 10 beats; local cycle 5. PBJ=⅕ (on 4-count base), CJ=3, OJ=2, spin 5 (were it not for sharp turns at 3 and 8, spin would be 4, but in fact it takes more rotating to get through one cycle); distance = a bit longer than a weave or eggbeater  First tried Aug 27, 2017 by Mike, Mel, Conor, Nick, and Jason. We usually do this on a 4-count base to keep the moves doable. So, e.g., each juggler passes 4 in a row on that count, and then has a break. But each juggler only passes to 2 other jugglers. Note the **sharp turns** going from positions 2-to-3 and 7-to-8. Add a post to soak up the self beats if you have one more juggler! | | | | | | |

### 

### **Eggbeaters**

| **Eggbeater (original)** | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | Feeder **A** - the *handle* - passes to 4 movers in 2 pairs of 2 spinning around each other. **B** and **C** form one *beater*, and **D** and **E** another. It's pretty good for beginner movers on the original base count (2-count), but you have to think because your count changes as you go: 6-count; 4-count; 6-count. Performed by Mad-5 at 1997 Madfest. |
|
|
|  | **Beat (2-count base)** | | | | | | | | **3-4-5 Eggbeater** | |
|  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | A beautiful variation emerges if **A** speeds up to 3-count from 4-count. Then movers have a 3-count gap between their stationary passes, a 4-count gap to move to the bottom of the bowl, and a 5-count gap to come back to the top. It’s fast and uses both hands!  The standard 2-count base, 8-beat cycle eggbeater is written on a 1-count base in the table below (row 2). The third shows how the 3-4-5 eggbeater works out on that 1-count base. In other words, it’s the same table as left except on a 3/2-count base! | |
| **A** |  | **E** |  | **B** |  | **D** |  | **C** |
| **B** | **D** |  | **E** | **A** | **D** |  | **E** |  |
| **C** | **E** |  | **D** |  | **E** |  | **D** | **A** |
| **D** | **B** |  | **C** |  | **B** | **A** | **C** |  |
| **E** | **C** | **A** | **B** |  | **C** |  | **B** |  |
| Light grey are extra passes in a Martin Frost variation born at 1996 Madfest. | | | | | | | | |
| **Eggbeater – handle-in-the-batter** For this variation, move **A** to the bottom of the bowl, but retain the passing sequence. | | | | | | | | | | |
| **Metrics**: J=5, cycle length=8, base count=2 (original), OJ=((3)(4)+(4)(1))/5=5 ⅕, CJ=3, distance=JU\*\*, spin=\*\*; PBJ=((1)((1/4)+(4)(3/16))/5=⅕ (original); ((1)(⅓)+(4)(¼))/5=4/15 (3  *3-4-5*: PBJ=((1)(⅓)+(4)(3/12))/5=4/15, cycle=12 on 1-count base. *Martin’s*: PBJ= ((1)(¼)+4(5/16))/5=3/10.  **Origins:** 3-4-5 born about 2016. Mad-5 performed in the 90's. Mike proposed handle-in-the batter. | | | | | | | | | | |

#### **\*\*NATHAN’S NOTES ON THE CLUB SEQUENCES, RETURNS, AND PIANOS\*\***

| **Involuted Eggbeater** | | | | | | | | | This pattern is a cool way to get the handle into the action by continuously swapping with the beaters! | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | | | | | | | On the 2-count base, there’s a 4-count gap from the handle (top circle) into an upper beater position [upper square] (e.g. **A**’s start), then 2 passes there on a 6-count gap, then an 8-count to get to the bottom of the bowl (lower circle), and a 12-count gap to get back to the top! There are 30 right hand beats to get around, which seems excessive but doesn’t feel so bad when juggling, thanks to symmetries I guess. First done Nov 2, 2017 (long after the original egg-beater) by Graham=**A**, Mel=**B**, Mike=**C**, Jeff=**D**, Nick=**E**; , and more recently done with lights on Library Mall, Aug 25, 2022! |
|  | **Base beat (2-count standard); ½ cycle** | | | | | | | | | | | | | | |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| **A** |  | **C** |  | **B** |  |  | **D** |  |  |  | **E** |  |  |  |  |
| **B** | **E** |  |  | **A** |  |  |  | **C** |  |  |  |  |  | **D** |  |
| **C** |  | **A** |  |  |  |  |  | **B** |  | **D** |  |  | **E** |  |  |
| **D** |  |  |  |  | **E** |  | **A** |  |  | **C** |  |  |  | **B** |  |
| **E** | **B** |  |  |  | **D** |  |  |  |  |  | **A** |  | **C** |  |  |
| **Metrics**: \*\* big distance \*\* lots of room for more passes! CJ=3, OJ=4, PBJ=4/30, cycle length=30, spin= \*\*should try it on 3/2 count or add passes…eg, on way back to top\*\*[could show position mapping here or in appendix?] | | | | | | | | | | | | | | | | |

| **Deathbeater** Make sure you have mastered the regular *eggbeater* before you attempt this riskier version! | | | | | | | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Base beat**  **(2-count standard) ½ cycle** | | | | | | | | | |  | |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| **A** |  | **D** |  | **C** |  |  | **D** |  | **C** |  |
| **B** | **C** |  | **E** |  |  | **C** |  | **E** |  |  |
| **C** | **B** |  |  | **A** |  | **B** |  |  | **A** |  |
| **D** |  | **A** |  |  | **E** |  | **A** |  |  | **E** |
| **E** |  |  | **B** |  | **D** |  |  | **B** |  | **D** |
| All jugglers do the same sequence, shifted in time, and they move through all five positions, completing a full cycle in 20 passing beats. What used to be the stationary handle is now being constantly replaced by jugglers shifting into that position; a juggler moves into the handle after completing the two crossing (odd-beat) passes (two squares). The handle position (top circle) passes to receivers in the bottom of the bowl (bottom circles)**,** and on their turn they pass and move out immediately in order to clear the next pass that occurs between the two sides**.** That special pass/move role is pretty tricky (even beats)**.** All jugglers do the same 5-beat sequence, but out of phase: **pass-phantom-pass-phantom-phantom,** and each juggler passes to two of the other four. The pattern has the same pass-twice then move as the egg-beater, but movement is completely different. (We could say **self** instead of **phantom**, but we’re referring to the base passing beat, so **phantom** seems more appropriate.)In the inaugural running of this pattern (by Mike, Mel, Mark, Carly, and Chan, March 20, 2025), we started on a 4-count base. It's amusing to watch people hesitate in the topspot and miss their opportunity to move down to the bottom of the bowl**.**  **Metrics**: J=5, cycle length=20, base count=2 (standard) (4 for starters!), OJ=2, CJ=3, spin=\*\*; PBJ=4/20=0.2, distance=\*\*JU | | | | | | | | | | | | |

| **Four Leaf Clover** | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| The deal with clover patterns is that the number of jugglers is one more than the number of leaves; there's always one juggler on each leaf and one extra in the middle, about to swap places with one of the leaves. This is a very pleasant 5 person moving pattern on a 2-count or 3-count base; all jugglers do the same thing in the steady state: feed three (right to left); 2-selves to move into middle; pass in middle; 4 selves to get out. That's a **2-in-4-out,** in contrast to the **2-in-2-out** three-leaf clover for four jugglers. | | | | | | | | | | | |
|  | | | | | | | | | | | Shown left are 10 beats (local cycle) of 40 required to get everyone situated at the same place. The 11th beat has the whole pattern rotated a ¼ turn (technically, the passing sequence has completed a full cycle, even though the jugglers are repositioned!).  After feeding, you have 2 beats to move straight across, then 4 easy beats to move out left and set up for the next cycle. It can clog up in the middle if you’re not careful with those 2 entering beats.  Patterns by MAJ. |
|  | **Beat (base count; e.g. 2 count)** | | | | | | | | | | **Variations:** Aside from count variations (2 and 3 most common), *extra passes* are available to jugglers moving through (one version is noted in grey in table left).  Watch the 4-leaf clover on 3-count (<https://www.youtube.com/watch?v=ikqU-CTVB9o>) |
|  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| **A** | **B** | **C** | **D** | **C** |  | **E** |  | **E** |  |  |
| **B** | **A** | **E** |  | **D** |  | **D** |  |  | **C** | **E** |
| **C** |  | **A** |  | **A** |  |  | **E** | **D** | **A** | **D** |
| **D** |  |  | **A** | **B** | **E** | **B** |  | **C** |  | **C** |
| **E** |  | **B** |  |  | **D** | **A** | **C** | **A** |  | **B** |
| **Metrics**: J=5, cycle=10, base count=2 (standard), OJ=4, CJ=3, JU=\*\*, spin=\*\*; PBJ=4/20=1/5, (standard, 2-count base); PBJ=3/10 (extra passes). | | | | | | | | | | | |

| **Three Leaf Clover with One Orbiter (the after-feed orbiter)** | | | | | | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Revisit the 4-person *3-leaf clover*, but add a juggler to absorb some of those pesky self throws!  One orbiter, **E**, passes to the person who has just finished their feed…in this version the orbiter is on an inside small loop going clockwise (from above perspective!); orbiter passes **D, A, C, B,** repeat; there’s also an outside big loop, also going clockwise, as an alternative…big circle flying around the outside clockwise also (often Nick!) [start the outside just beyond A, then move to pass to **C, B,** then **D, A.**  In this version the orbiter isn’t really ‘orbiting’ at all, they are smack in the middle of the pattern. As drawn, **E** is on a small circle; but it also works with **E** more or less stationary, just rotating around on the ½ count to make all the necessary passes. Then the clover-movers just need to be sure to avoid this person. \*\*it becomes a 1-in-2-out clover\* [3-count more relaxing!] | | | | | | | | | | | |
|  | | | | | | | | | | \*\*talk about outside orbiter variation\*\* | |
|  | **Beat (base count; e.g. 2 count)** | | | | | | | | **Metrics:** J=5, cycle=8, base count =2, OJ=4, CJ=3, distance = ?, spin= ?, PBJ=(4x5+1x4)/(5x16)=0.3 on 2-count. | | |
|  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| **A** | **D** | **B** | **C** | **E** |  | **B** |  |  |
| **B** |  | **A** |  |  | **C** | **A** | **D** | **E** |
| **C** |  |  | **A** | **D** | **B** | **E** |  | **D** |
| **D** | **A** | **E** |  | **C** |  |  | **B** | **C** |
| **E** |  | **D** |  | **A** |  | **C** |  | **B** |

| **Gauntlet** | |
| --- | --- |
|  | This is an easy but need-to-pay-attention moving pattern, which the **Cool Guyz** used once to exit the Madfest stage. It’s a 5-person 4-count. On each passing beat, one juggler (clear circle in figure) has 2 clubs, and doesn’t pass. (That’s **C** at top of the pattern.) These blank beats occur twice in a row for each juggler, as he/she moves through the middle and waits to receive a pass at the bottom of the pattern. The leader calls out *down, box, down, box* on passing beats, and the passes and movements proceed as the whole pattern moves across the room/stage!  **Metrics:** cycle length…who knows… PBJ = ?, CJ=14/5, J=5  Origin: Ask Mel |
|
|
|

| **Strange Attractor/Estranged Tractors** | | | | |  | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat, base count**  **(2-count rights is standard)** | | | | | | | | |
|  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** |
| **A** | **B** | **C** | **E** | **E** | **B** |  | **C** | **D** | **D** |
| **B** | **A** | **D** | **D** | **C** | **A** | **E** | **E** | **C** |  |
| **C** | **E** | **A** |  | **B** | **D** | **D** | **A** | **B** | **E** |
| **D** |  | **B** | **B** |  | **C** | **C** |  | **A** | **A** |
| **E** | **C** |  | **A** | **A** |  | **B** | **B** |  | **C** |
| This came from trying to fill in the self gaps of a *Turbo* using two stationary jugglers **D** and **E.** But on close inspection you’ll see that movers **A, B, C** are actually doing a variation of the *Turbo*; a lot of work for them, with just one self-beat to turn within each ½ cycle.  **Metrics**: J=5, cycle=18 beats (½ shown); PBJ is high! [(3)(8)+2(6)]/[(2)(5)(9)]=0.4; CJ=3, OJ=4, spin=\*\*, distance=\*\*  Pattern by MAJ. | | | | | | | | | | |

### 

| **El Turbo with one post** | | | | | | | | | | |  | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Beat, base count (2-count rights is standard;3-count is pleasant!)** | | | | | | | | | | | | | | | |
|  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** |
| **A** | **B** | **D** | **C** | **B** | **E** | **C** |  | **E** | **B** |  | **E** | **B** |  | **E** | **D** |  |
| **B** | **A** |  | **E** | **A** |  | **E** | **C** |  | **A** | **C** | **D** | **A** | **E** | **D** |  | **E** |
| **C** |  | **E** | **A** |  | **D** | **A** | **B** | **D** | **E** | **B** |  | **E** | **D** |  | **E** | **D** |
| **D** | **E** | **A** |  | **E** | **C** |  | **E** | **C** |  | **E** | **B** |  | **C** | **B** | **A** | **C** |
| **E** | **D** |  | **B** |  | **A** |  | **D** |  | **C** |  | **A** |  | **B** |  | **C** |  |
| **E** |  | **C** |  | **D** |  | **B** |  | **A** |  | **D** |  | **C** |  | **A** |  | **B** |
| ½ cycle shown. **A, B, C,** and **D** do the *El Turbo,* and **E** is the post picking up some selves. The figure/table allow two different positions for that single post (see ahead to 6-person patterns where we add 2 posts). But here there’s either an odd-beat post (**E),** or an even-beat post **(E).**  Pattern by MAJ [See *El Turbo* (4-person) for more on the base pattern] | | | | | | | | | | | | **Metrics**: J=5, Cycle=16, PBJ=((4)(10/16)+(1)(8/16))/((5)(2))=3/10! CJ=3, OJ=4, spin=\*\*, distance=\*\*  As in *El Turbo*, each juggler feeds 4 spots (with #1 and #4 the same person), before moving on. Those feeds are highlighted in the passing table. | | | | | |

### 

| **5-person laxative-V1** | | | | | | | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Beat, base count (7-count or 5-count)** | | | | | | | | | | | |
|  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | Take the original 3-person laxative, and allow two orbiter-like folks to swap in and out.  While you’re **in** the laxative portion, you pass three times to the same person (grey box shading), and you receive three times, though from three different folks who move in/out of the laxative.  OK, we’ve not actually juggled this on yet (as of November 2025), and one worries it might go the way of the dodo-bird and the *Quincunx,* since both the moving and the passing sequence take some memory!  **But it looks great, right!**  Another, more streamlined extension of the 3-person laxative is shown next.  **Metrics:** J=5,Cycle=10, CJ=3, OJ=4, PBJ=1/count. Distance \*\* spin\*\*  Pattern by Prof. Mike, April 16,2020. | |
| **A** | **B** | **B** | **C** | **D** | **C** | **B** | **C** | **E** | **D** | **B** |
| **B** | **D** | **E** | **D** | **C** | **D** | **A** | **E** | **C** | **C** | **C** |
| **C** | **E** | **D** | **E** | **B** | **A** | **D** | **D** | **D** | **E** | **A** |
| **D** | **A** | **C** | **B** | **E** | **E** | **E** | **A** | **B** | **A** | **E** |
| **E** | **C** | **A** | **A** | **A** | **B** | **C** | **B** | **A** | **B** | **D** |
|  | | | | | | | | | | |

| **Decagon: 5-person laxative-V2** | |  | |
| --- | --- | --- | --- |
| A very cool non-trivial extension of the 3-person laxative. As in the 3-person version, the who-passes-to-whom graph is always the same (i.e., a local passing cycle of 1 beat). But the moves, oh, the moves take some practice! | |
|  | **Beat, base count,**  **(9 or 7 count)** | | |
|  | **right** | **left** |
| **A** | **B** | **B** |
| **B** | **C** | **C** |
| **C** | **D** | **D** |
| **D** | **E** | **E** |
| **E** | **A** | **A** |
| **Metrics:** J=5, cycle=10, CJ=3, OJ=2, PBJ=1/count, Distance high [from decagon props\*\* spin\*\*  Pattern by Nathan/Peter | | |
| It’s a bit tricky remembering who goes next; lead moving goes in order: **A, B, C, D, E**, but everyone moves across or shifts after every pass (grey above). Everyone occupies every corner of a decagon for a full cycle (i.e., 10 beats on some convenient odd count). There’s an earlier version where a single person moves across and every one else shifts, but you don’t retain the nice who-to-whom constancy like in this version! Moves are *long-cross,* *short-cross*, *slide*, *slide*, *short-cross*, repeat. Interestingly, this motion traces the edges of three rhombuses (rhombi?), as the figure upper right shows. | | | |

### 

| **Twirly Star** Here's a fun variation on the 4-person *Shooting Star*, but with 5 people and with moves restricted to spinning in place! These pirouette’s **↻** happen while you have 2 clubs. | | | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E** starts with 2 clubs  **↻** = pirouette | **Beat (2-count right-hand base)** | | | | | | Make sure to keep the count after the **↻**! At first you can just pause for 2 counts instead of pirouetting.  **Metrics**: J=5, OJ=1, distance=0, PBJ=0.4, CJ=14/5. spin=\*\*  Pattern by Luke Emery. |  |
|  | **1** | **2** | **3** | **4** | **5** |  |
| **A** | **D** | **D** | **↻** | **D** | **D** |  |
| **B** | **E** | **E** | **E** | **E** | **↻** |  |
| **C** | **A** | **↻** | **A** | **A** | **A** |  |
| **D** | **B** | **B** | **B** | **↻** | **B** |
| **E** | **↻** | **C** | **C** | **C** | **C** |  |

| **Quincunx** | | | | | | | | | | | | | | | | |  | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Beat, base count (4-count rights is standard)** | | | | | | | | | | | | | | | | |
|  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
| **A** | **E** | **C** | **C** |  |  | **D** | **D** | **B** | **B** | **C** |  | **B** | **B** | **D** | **C** | **E** | **E** |  | **D** | **E** |
| **B** | **D** | **E** |  | **D** | **D** | **C** | **E** | **A** | **A** |  | **C** | **A** | **A** | **E** | **E** |  |  | **C** | **C** | **D** |
| **C** |  | **A** | **A** | **E** | **E** | **B** |  | **E** | **E** | **A** | **B** | **D** | **D** |  | **A** | **D** | **D** | **B** | **B** |  |
| **D** | **B** |  | **E** | **B** | **B** | **A** | **A** |  |  | **E** | **E** | **C** | **C** | **A** |  | **C** | **C** | **E** | **A** | **B** |
| **E** | **A** | **B** | **D** | **C** | **C** |  | **B** | **C** | **C** | **D** | **D** |  |  | **B** | **B** | **A** | **A** | **D** |  | **A** |
|  | | | | | | | | | | | | Arrows left indicate motion. Jugglers take turns entering the middle, sweeping around the corners, and then backing out of the middle. Each such move entails 6 passes in a row (shaded in table), including two repeats on the entry and two repeats while backing out on the exit.  **Metrics:** J=5, Cycle=20, CJ=3, OJ=4, PBJ=⅕. Distance \*\* spin\*\*  Pattern by Prof. Mike. It’s an uncomfortable word to pronounce, but recall that “quincunx” is the shape of five dots on dice. | | | | | | | | |
| Ahhh...Quincunx. We don't actually juggle this pattern much anymore. We just talk about it.  Whenever we can't think of a pattern to try, someone inevitably says, “Let's do Quincunx!” Then we all laugh. Ha, ha! Ok, seriously. What should we do? With no disrespect for Mike intended, this is kind of a dumb pattern. It's complicated and almost impossible to remember for a full cycle. Though we rarely juggle this pattern, it was an early non-weave moving pattern, and it surely prepared the Mad-5 for the rigors of more serious passing! | | | | | | | | | | | | | | | | | | | | |

| **Meltic Knot** A recent edition from the desk of Mellonhead! | | | | | | | | | | | | | | | | |  | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Beat, base count (5-count is standard)** | | | | | | | | | | | | | | | | |
|  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
| **A** | **C** | **E** | **B** | **D** | **⬆** |  | | | | | | | | | | | | | | |
| **B** | **⬆** | **D** | **A** | **C** | **E** |
| **C** | **A** | **⬆** | **E** | **B** | **D** |
| **D** | **E** | **B** | **⬆** | **A** | **C** |
| **E** | **D** | **A** | **C** | **⬆** | **B** |
| **Local cycle = 5 beats** | | | | | |
| This is a nifty variation of the six-person *Celtic Knot,* though shaped like a *Quincunx.* It’s surprisingly easy to remember and also a bit tricky to perform. Even forgetting the move in and out of the middle (shaded box and arrow), you are constantly swinging back and forth through a ¼ circle to pass to your neighboring corner.  **Metrics:** J=5, cycle=20, CJ=3, OJ=4, PBJ=⅕ Distance \*\* spin\*\*  Pattern by Mellonhead (who prefers 6-count!), December 11, 2025. | | | | | | | | | | | | | | | | | | | | |

| **Chocolate Swirl-I** | | | | | | | | | | | | | | | Here’s a nice but not-often juggled 2-v-3 pattern with change side moves, based on the *double-chocolate double-3-count* stationary pattern. Owing to different ways to reset the 2-v-3 after a move, we get several variations.  Jugglers need to shift through an arc as one by one they change sides.  Original pattern by Luke Emery; variations here by Prof Mike aim to respect the *Southern Wisconsin Convention (SWC).* | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | | | | | |
| In moving patterns like this, the SWC holds that a switch-sides move off the right side of a line (from the perspective of those in the line) occurs as the mover is receiving a pass into their left hand and releasing a pass from their right. (Likewise, but not applicable in the current pattern, moves off the left side of the line occur as a mover passes a left while receiving a pass into the right (i.e., inside) hand.) Luke Emery’s original *chocolate swirl (*see v 3.0) had a long cycle and violated SWC (and we didn’t juggle it much!). The version shown here approximates Luke’s, but loses a nice feature involving the 1-self switch sides (but see below!); here, after a switch, there are 6 counts from a standard start, then switch, then repeat. ⅗ of pattern is tabulated. | | | | | | | | | | | | | | | | | | | | |
|  | **Beat, 1-count base (feeders in *italics*)** | | | | | | | | | | | | | | | | | | | |
|  |  |  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** |
| **A** | **C** | **C** | ***D*** | ***C*** | ***C*** | ***D*** | ***C*** | ***C*** | **C** | **C** | **-** | **C** | **C** |  | **-** | **B** | **B** | **-** | **B** | **B** |
| **B** | **E** | **D** | ***E*** | ***E*** | ***D*** | ***E*** | ***E*** | ***D*** | **D** | **-** | **C** | **D** | **-** | **C** | ***C*** | ***A*** | ***A*** | ***C*** | ***A*** | ***A*** |
| **C** | **A** | **A/** | **-** | **A** | **A** | **-** | **A** | ***A*** | ***A*** | ***A*** | ***B*** | ***A*** | ***A*** | ***B*** | **B** | **-** | **E** | **B** | **-** | **E** |
| **D** |  | **B** | **A** | **-** | **B** | **A** | **-** | ***B*** | ***B*** | ***E*** | ***E*** | ***B*** | ***E*** | ***E*** | **E** | **E** | **-** | **E** | **E** |  |
| **E** | **B** |  | **B** | **B** | **-** | **B** | **B** |  | **-** | **D** | **D** | **-** | **D** | **D** | ***D*** | ***D*** | ***C*** | ***D*** | ***D*** | ***C*** |
| **Metrics:** J=5, CJ=3, cycle=30, base=1-count, PBJ= , OJ=4, spin = , distance | | | | | | | | | | | | | | | | | | | | |

| **Chocolate Swirls (II and III)** | | | | | | | | | | | Born from changing sides in a 2-v-3 *double-chocolate double 3-count*, these patterns are A level with 1-count passing and movement (respecting the Southern Wisconsin Convention). *Chocolate Swirl II* is more or less a chocolate bar feast. In this variation, the change sides use 2 selfs (like *El Nino,* i.e. on 3-count).  *Chocolate Swirl III,* AKA *Tempered Chocolate,* maintains the 1-self change side (from Luke’s original)  **Rule:** *move-three-one-self-one-three.* (1st done at MCS 11/30/2025 by Mike, Luke, Mel, Nathan, and Mark.) Both variations have a pretty short cycle! Feeders below are in italics (and shaded). Moves are on black. | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| **Version II (1-count base)** | | | | | | | | | | | **Version III (1-count base)** | | | | | | | | | | |
|  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| **A** | ***D*** | ***C*** | **C** | **⬆** | | **B** | ***B*** | ***E*** | **E** | **D** | ***C*** | ***C*** | **C** | **⬆** | **B** | **B** | ***B*** | ***E*** |  | **D** |
| **B** | ***E*** | ***D*** | **D** | **C** | ***C*** | ***A*** | **A** | **⬆** | | **E** | ***E*** | ***D*** |  | **C** | ***A*** | ***A*** | **A** | **⬆** | **E** | **E** |
| **C** |  | **A** | ***A*** | ***B*** | **B** | **E** | ***E*** | ***D*** | **D** | **⬆** | **A** | **A** | ***A*** | ***B*** |  | **E** | ***D*** | ***D*** | **D** | **⬆** |
| **D** | **A** | **B** | ***B*** | ***E*** | **E** | **⬆** | | **C** | ***C*** | ***A*** |  | **B** | ***E*** | ***E*** | **E** | **⬆** | **C** | **C** | ***C*** | ***A*** |
| **E** | **B** | **⬆** | | **D** | ***D*** | ***C*** | **C** | **A** | ***A*** | ***B*** | **B** | **⬆** | **D** | **D** | ***D*** | ***C*** |  | **A** | ***B*** | ***B*** |
| **Metrics:** J=5, CJ=3, cycle=10, base=1-count, PBJ=⅘, OJ=4, spin = , distance, pH=1 | | | | | | | | | | | | | | | | | | | | | |

### 

| **Isla Vista Weave** Make a weave out of the *Stationary* *Isla Vista Weave!* | | | | | | | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2666 version** | | **Beat (2-count base; i.e. right-hand counting)** | | | | | | | | | |  |
| Take the *Stationary Isla Vista weave,* which has jugglers in a circle, and have them alternate though 2-v-3 formations with feeders in the 2 and then moving out in figure 8 after feed. Frankly, it’s a bit too much moving without passing for our tastes! |  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |  |
| **A** | **D** | **C** |  |  | **C** |  |  | **D** |  |  |  |
| **B** |  |  | **E** | **D** |  |  | **D** |  |  | **E** |  |
| **C** |  | **A** |  |  | **A** | **E** |  |  | **E** |  |  |
| **D** | **A** |  |  | **B** |  |  | **B** | **A** |  |  |
| **E** |  |  | **B** |  |  | **C** |  |  | **C** | **B** |  |
|  | | | | | | | | | | | |  |
| **Metrics:** J=5, OJ=2, CJ=3, distance=\*\*, spin=\*\*, PBJ=⅕, pH=1, cycle=? | | | | | | | | | | | |  |

### 

## **Extra Club Moving 5 Person Patterns**

| **Eggbeater Plus** The ideal entry-level extra club moving pattern! | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | Feeder **A** - the *handle* - starts with 4 clubs and passes to 4 movers in 2 pairs of 2 spinning around each other. **B** and **C** form one *beater*, and **D** and **E** another. Same as the original *eggbeater*, except all passes to and from **A** are triples!  Pattern by Luke Emery |
|
|
|  | **Beat, 2-count base (right-hand)** | | | | | | | | Shaded passes are optional singles!  **Metrics**: J=5, cycle length=8, base count=2 , OJ=3 ⅕, CJ=3 ⅕ , distance=JU\*\*, spin=\*\*; PBJ=⅕, pH=(8\*3+8\*1)/16=2. | |
|  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| **A** | t-**E** |  | t-**B** |  | t-**D** |  | t-**C** |  |
| **B** | **D** |  | **E** | t-**A** | **D** |  | **E** |  |
| **C** | **E** |  | **D** |  | **E** |  | **D** | t-**A** |
| **D** | **B** |  | **C** |  | **B** | t-**A** | **C** |  |
| **E** | **C** | t-**A** | **B** |  | **C** |  | **B** |  |

| **Apollo Plus Weave** Here's a nice but non-trivial extra-club weave pattern for triple lovers! | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Start with the *Apollo* (*1-1-3* formation) and have **B** feed a standard weave of **C, D** and **E**. Then **A** can add an extra club and throw 4-count triples to the ends. **A** starts with 4 and a triple to whichever end **B** doesn't start with. All the weavers will have the following sequence (starting from the outside): ***B****, self, self,* ***B****, self, triple to* ***A****,* ***B****.*  **Metrics:** J=5, OJ=2.4, PBJ=0.3, pH=(3\*6+1\*12+3\*4+3\*2)/(6+12+3\*6)=4/3, spin=0, distance=  Expands nicely to *1-2-3 Apollo* for 6 jugglers and the *1-2-4 Apollo* for 7 jugglers | | | | | | | | | | | | | |
|
|  | **Beat, 2-count base (right-hand counting)** | | | | | | | | | | | | Pattern by Luke Emery. |
| **Juggler** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **A** | t-**E** |  | t-**D** |  | t-**C** |  | t-**E** |  | t-**D** |  | t-**C** |  |
| **B** | **C** | **D** | **E** | **C** | **D** | **E** | **C** | **D** | **E** | **C** | **D** | **E** |
| **C** | **B** |  |  | **B** |  | t-**A** | **B** |  |  | **B** |  | t-**A** |
| **D** |  | **B** |  | t-**A** | **B** |  |  | **B** |  | t-**A** | **B** |  |
| **E** |  | t-**A** | **B** |  |  | **B** |  | t-**A** | **B** |  |  | **B** |

| **Twister Plus** | | | | | | | | | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| In this beautiful variation of the *Twister Weave*, stationary feeders **A** and **B** replace their right-hand selves with triple passes back and forth over the top of the weave, in 7-club 4-count style (i.e., 1 extra club). The weaving pattern is exactly the same as the original *Twister Weave*; i.e. 6-count, alternating to **A** and **B** as weavers **C**, **D**, and **E** move through a figure 8. **B** starts with 4 clubs, tripling to **A**; all others start with 3 clubs. **A** starts with **C** then triples back to **A**.  Pattern by MAJ. Performed by Mad-5 at 1999 IJA, and elsewhere. | | | | | | | | | | | | | |
|
|  | | **Beat (2-count base); ⅔ cycle** | | | | | | | | A nice motion variation is for the weavers to do ½ pirouettes under a triple right to left self throw for their turn out of the middle.  **Metrics**: J=5, OJ=2.4, CJ= 16/5=3.2, PBJ=3/10, cycle length=12 on 2-count base. pH=5/3 , spin= 4 per weaver. Distance=\*\* | | | | |
| **Juggler** | | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
|  | **A** | **C** | t-**B** | **E** | t-**B** | **D** | t-**B** | **C** | t-**B** |
| **B** | t-**A** | **D** | t-**A** | **C** | t-**A** | **E** | t-**A** | **D** |
| **C** | **A** |  |  | **B** |  |  | **A** |  |
| **D** |  | **B** |  |  | **A** |  |  | **B** |
| **E** |  |  | **A** |  |  | **B** |  |  |
| **Luke’s variations:**  All triples: add 2 clubs to the standard *Twister Weave* and make the passes from **A** and **B** to the weavers be triples (7 club 4-count between each side of the weave and the feeder), and the return passes triples too; then feeders are doing 2-count triples. Another variation is to add 2 extra clubs and have the feeders do 4-count in fast popcorn (534p3).  **Metrics:** \*hard\* | | | | | | | | | | | | | | |

| **Double Time Twister Plus** Raining doubles! | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| This *Twister* variation eliminates triple passes between feeders but adds all double passes into the weavers, who now have to make precise double throws back with very little time to turn (4-count)! Feeders **A** and **B** are offset from the weavers, and both start with 3, with left-hand self-throws on first beat. Weavers **C** and **E** both start with 4 and lead off with right doubles. | | | | | | | | | | | | | |
|
| **Juggler** | | **Beat (1-count base), ½ cycle shown** | | | | | | | | | | | |
|  |  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **A** |  | **C** |  | **E** |  | **E** |  | **D** |  | **D** |  | **C** |
| **B** |  | **D** |  | **D** |  | **C** |  | **C** |  | **E** |  | **E** |
| **C** | **A** |  | **A** |  |  |  | **B** |  | **B** |  |  |  |
| **D** |  |  | **B** |  | **B** |  |  |  | **A** |  | **A** |  |
| **E** | **B** |  |  |  | **A** |  | **A** |  |  |  | **B** |  |
| **All passes are doubles!** | | | | | | | | | | | | |
| **Metrics**: J=5, cycle length=24 on 1-count base, OJ=(2\*3+3\*2)/5=2.4, CJ=17/5=3.4, pH=2, PBJ=⅖ , Distance= , spin=really hard!  Pattern by Luke Emery and MAJ. | | | | | | | | | | | | | |

| **Mango Swirl (aka Mangled Squirrel)** | | | | | | | | | | | | | Everybody in the action!  *Triple 2-1-2* | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| In this high-end extra-club/moving pattern, the difficulty is balanced, and all 5 jugglers have to be good! (Practice change-side 10-club feed with 3 jugglers for warm up.)  The basic set up is a 2-v-3, like the *Chocolate Swirl, but* now with 2 extra clubs. Continuously, the juggler on the feeders’ left switches sides creating flipped 2-v-3. **A** and **B** start with 4, and sync up passing to responders **D** and **E**, respectively, to start. In steady state, **B** is on a pause for beat 1, but throws a double to **E** to start the pattern. Also, **C** ordinarily is moving on beat 1, with hands synced like **A**, but **C** can start where they would have ended up (and double respond on beat 4 if they prefer). Moves are all on 4-count change-side, with triples back to reset the timing.  **Rule:** move, triple pass, 2 doubles to one, 1 double to the next, 2 doubles to the next. That is, *Triple-2-1-2*.  Our first attempts were more mangled than mango,and more squirrelly than swirly and thus its alternate name. Pattern by Luke Emery. | | | | | | | | | | | | | | | | **Beat**  **1-cnt** | **Juggler** | | | | |
| **A** | **B** | **C** | **D** | **E** |
| **1** | **D** | **E** |  |  |  |
| **2** |  |  | **A** | **B⬆** |
| ***3*** | **C** | **D** | t-**A** |  | **⬆** |
| **4** |  |  | ***–*** | **B** |
| **5** | **C** | **D** |  |  |
| ***6*** | **⬆** |  | **B** | **E** | t-**D** |
| ***7*** | **C** |  |  | ***–*** |
| ***8*** |  | **B** | **E** |  |
| **9** | t-**B** | **A** |  | **⬆** | **C** |
| **10** | **–** |  | **E** |  |
| **11** |  | **A** |  | **C** |
| **12** | **E** | **⬆** | **D** | t-**C** |  |
| **13** |  |  | **–** | **A** |
| **14** | **E** | **D** |  |  |
| **15** |  | t-**E** | **⬆** | **A** | **B** |
| **1** | **D** | **–** |  |  |
| All passes are right doubles, except for the right triples indicated with `t`. The change sides are indicated with a black-shaded box and up arrow. Note jugglers hands are offset. For instance **A** and **B** pass rights on beat 1, while **C, D**, and **E** are synced up but start with left self throws. The grey-shaded boxes and `-` indicate pauses where the hand timing switches. | | | | | |
| **Metrics:** J=5, CJ=3.4, cycle=15, base=1-count, PBJ=⅖ , OJ=4, spin = , distance, TH=2 ⅙ (that’s a lot!) | | | | | | | | | | | | | | | | | | | | | |

| **Whirling Melvish** | | | | | | | | | | | | |  | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| In the stationary *14 club triples/4-count box* there’s room in the middle for one or two extra jugglers. Having them pass with the corners while turning through a circle is the *Whirling Melvish*. | | | | | | | | | | | | |
|
| In this version, one Melvish, **M** (the juggler in the middle, who may or may not be named Melonhead), passes twice to each corner, then rotates a ¼ turn and repeats. **A** and **B** start with 4. **A** and **C** release rights on beat 1. **B** and **D** start on beat 2 with their rights, or start with the others on beat 1, but with lefts. | | | | | | | | | | | | | | | | |
| **Beat, 1-count base; partial (4/9) cycle shown** | | | | | | | | | | | | | | | | |
|  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** |
| **A** | t-**C** |  | **M** |  | t-**C** |  | **M** |  | t-**C** |  |  |  | t-**C** |  |  |  |
| **B** |  | t-**D** |  |  |  | t-**D** |  |  |  | t-**D** |  | **M** |  | t-**D** |  | **M** |
| **C** |  |  | t-**A** |  |  |  | t-**A** |  |  |  | t-**A** |  |  |  | t-**A** |  |
| **D** |  |  |  | t-**B** |  |  |  | t-**B** |  |  |  | t-**B** |  |  |  | t-**B** |
| **M** |  | d-**A** | **pa** |  |  |  | **A** | **¼ turn** | | | d-**B** | **pa** |  |  |  | **B** |
| On beat 2**, M** passes a straight right double, then pauses (grey box, **pa**), then does a standard 4-count pass to one corner (**A** in this case), then turns and throws an early straight double in 4-count to the next corner, then pauses again and resumes the 4-count. Moving after every 2 passes (1 double and 1 single) is a nice timing. Each passing segment by **M** to one of the outside jugglers takes 9 1-count beats. With the local 4-count cycle for the outside jugglers, the full cycle becomes 36 1-count beats.  **Variation (for 6):** Add a second Whirling Melvish juggler in the middle back to back to the original mover. That juggler starts in a 4-count with **C** and does the same  thing as **M**, 2 beats later  **Metrics:** J=5, cycle=36, CJ=3.4, OJ=2.4, PBJ= Distance low \*\* spin low\* pH=\*\*[passing height] \*\*something is up with M’s gap\*\*a  Pattern by Luke Emery, 2000. | | | | | | | | | | | | | | | | |

| **Cathedral** A spectacular but challenging pattern! | | | | | | | | | | | | |  | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| This extension of the 3-person *GDP* to 5 jugglers has moves like a *4 leaf clover;* but it’s more boxy than clovery with 2 extra clubs and all triple passes over the top. The 4 outer jugglers maintain a *14 club box* in 4-count triples. The center juggler passes once with a leaf (double) and then replaces that leaf in a 6-count turn. | | | | | | | | | | | | |
|
| The table shows two transitions, where **E** replaces **A**, and then **A** pushes out **B**. All passes are rights, so **B, D**, and **E** start 1 count after **A** and **C**. **A** and **B** start with 4 clubs each. | | | | | | | | | | | | | | | | | | |
| **Beat, 1-count base** | | | | | | | | | | | | | | | | | | |
|  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** |
| **A** | t-**C** |  | **E** |  | t-**C** |  |  |  |  |  | d-**B** | **–** |  |  |  |  |  | t-**D** |
| **B** |  | t-**D** |  |  |  | t-**D** |  |  |  | t-**D** |  | **A** |  | t-**D** |  |  |  |  |
| **C** |  |  | t-**A** |  |  |  | t-**A** |  |  |  | t-**E** |  |  |  | t-**E** |  |  |  |
| **D** |  |  |  | t-**B** |  |  |  | t-**B** |  |  |  | t-**B** |  |  |  | t-**B** |  |  |
| **E** |  | d-**A** | **–** |  |  |  |  |  | t-**C** |  |  |  | t-**C** |  |  |  | t-**C** |  |
| **Metrics:** J=5,Cycle=45 (that’s long!)l, CJ=3.4, OJ=4, PBJ= Distance \*\* spin\*\*  Pattern by Luke Emery, 2000. | | | | | | | | | | | | | | | | | | |

| **Twister Popcorn** A popcorn pirouette challenge! | | | | | | | | | | | | Like the stationary *Popcorn Feed*, but with 2-feaders (**A** and **B**) and with 6-count popcorners (triple self, double pass, single self, counting the right side) **C, D,** and **E** alternating throws to **A** and **B,** who both typewriter feed.  **A** and **E** start with 4, and **C** starts with triple self. Popcorners respond to incoming double with a triple self.  Pattern by Luke Emery and MAJ. | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Beat, 2-count base (rights)** | | | | | | |  | | | | |
|  | **1** | **2** | **3** | **4** | **5** | **6** |
| **A** | d-**C** |  | d-**E** |  | d-**D** |  |
| **B** |  | d-**D** |  | d-**C** |  | d-**E** |
|  |  |  |  |  |  |  |
| **C** | t-**s** | d-**A** |  | t-**s** | d-**B** |  |
| **D** |  | t-**s** | d-**B** |  |  |  |
| **E** | d-**B** |  | t-**s** | d-**A** |  | t-**s** |
| **Local cycle 6 beats** | | | | | | |
| The hardest position is **D**, because he/she cannot cheat as much into the turns. You can either turn fast during the single self, throw a right to left single straight up in the air and do a ½ pirouette underneath it, or throw a behind the back self to turn.  **Metrics:** J=5, cycle=12 on 2-count base , CJ=3.4, OJ=2.4, PBJ=3.4 (not counting triple selves); TH=2, spin same as twister weave\*\* distance less | | | | | | | | | | | | | | | | | | |

#### 

| **Twister Popcorn Weave** Super challenging, but theoretically possible! | | | | | | | | | | | | Weavers **C, D,** and **E** are all doing 6-count popcorn (triple self, double pass, single self, counting the right side) while weaving!  **A** and **E** start with 4, and **C** starts with triple self. Weavers respond to incoming double with a triple self.  With only one right-self to switch sides while navigating your self triple and the doubles, this pattern is exceedingly difficult!  Pattern by Luke Emery | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Beat, 2-count base (rights)** | | | | | | | Feeders **A** and **B**  Drs. Inside/Outside    Weavers **C, D, E** | | | | |
|  | **1** | **2** | **3** | **4** | **5** | **6** |
| **A** | d-**C** |  | d-**E** |  | d-**D** |  |
| **B** |  | d-**D** |  | d-**C** |  | d-**E** |
|  |  |  |  |  |  |  |
| **C** | t-**s** | d-**A** |  | t-**s** | d-**B** |  |
| **D** |  | t-**s** | d-**B** |  |  |  |
| **E** | d-**B** |  | t-**s** | d-**A** |  | t-**s** |
| **Local cycle 6 beats** | | | | | | |
| **Metrics:** J=5, cycle=12 on 2-count base , CJ=3.4, OJ=2.4, PBJ=3.4 (not counting triple selves); TH=2, Distance \*\* spin same as twister weave\*\* | | | | | | | | | | | | | | | | | | |

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# **Six Person Patterns**

## **Stationary Six Person Patterns**

## 1-2-3 Apollo

This Apollo for 6 jugglers is another Madison classic. (There are Apollos for

all numbers.)

## 

## 

| | |

|------------|------------|

| ![](./media/image65.jpeg){width=40%} | ![](./media/apollo6table.png){width=35%} |

| positions | Right-hand counting |

Nice easy 4-count pattern.

## 

Pattern by MAJ.

## Feast

Everyone feeds everyone else.

\*\*Variation:\*\* When on 3-count, try to \*\*Picnic\*\*. I.e., do one cycle on straight

throws and the next on crossing throws. This creates some crazy Jim's jams.

## Argyles  
  
### Argyled Triangles  
  
Want to challenge your left-right passing? Try one of these.  
  
| | |  
|------------|------------|  
| ![](./media/image66.png){width=30%} | ![](./media/argyledtrianglestable.png){width=50%} |  
| positions | both-hands counting |  
  
  
A and D face each other, passing double 3-count with the rest. B,C, E, and F  
pass 3-count.  
  
  
It's trickier than you might think, even if you rock double-3 count. Helps if A and D make loopy  
passes to each other.

Pattern by MAJ.  
  
### Argyle Sock  
  
Everyone does double 3-count.  
  
| | |  
|------------|------------|  
| ![](./media/image67.png){width=30%} | ![](./media/argylesocktable.png){width=50%} |  
| positions | both-hands counting |  
  
  
See Anklet for a 4 juggler version.  
  
Pattern by MAJ.

## Hex  
  
This is a nice 3-count warm-up for a group of six jugglers. In the steady state all jugglers  
do the same thing.  
  
| | |  
|------------|------------|  
| ![](./media/image85.png){width=30%} | ![](./media/hextable.png){width=40%} |  
| positions | both-hands counting |  
  
  
\*\*Variation\*\* 7-Club 3-count Hex. For those seeking a challenge, try a Hex where each pair juggles a 3-count 7  
club pattern in doubles. It works if the passes are precise.  
  
Pattern by MAJ.

## **Extra Club Stationary Six Person Patterns**

## Bubbler of David  
![](./media/image86.png){width=30%}  
  
The Bubbler is a Star of David with interlocking triangles and extra clubs in  
4-count doubles (that's the effervescent part).  
  
A, C and D are in one triangle. They do a 4-count extra club triangle. The pass  
is a double from right hand to left hand. Each juggler passes to the juggler on  
their left The timing is a little fast and syncopated (A throws to C, C throws  
to D 4/3 beats after A, D throws to A 4/3 beats after C).

B, F and E are another triangle. They do a 4-count extra club triangle too. F  
throws at exactly the same time as A, E throws with C and D is synchronized with  
B.  
  
Get that pattern smooth first. Now, notice how the juggler across from you is  
doing a self at the exact same time as you are? Now, just pass the right hand  
single straight across.  
  
As always, timing is the key.  
  
This pattern doesn't lend itself to a table format because the counts aren't  
even, but it's easy to figure out.  
  
Pattern by MAJ.

## 

## 

## **Moving Six Person Patterns**

\*\*don’t forget Foie Mel, pollinator

## 6-Person Double Weaves  
![](./media/image68.png){width=30%}  
  
As you've seen, there are a mind boggling variety of possible weaves. Well, any of these weaves can be paired up with any other weave to make a double weave. The permutations are infinite, but here are some that we like.  
  
  
### Standard Double Weave  
  
If A, B and C do a standard weave and pass across to D, E and F in a standard weave, you get the Standard Double Weave.  
  
| \*\*Juggler/beat\*\* | \*\*1\*\* | \*\*2\*\* | \*\*3\*\* |  
|-------------|-------|-------|-------|  
| \*\*A\*\* | D | | |  
| \*\*B\*\* | | E | |  
| \*\*C\*\* | | | F |  
| \*\*D\*\* | A | | |  
| \*\*E\*\* | | B | |  
| \*\*F\*\* | | | C |  
  
> \* Right-hand counting  
  
The standard weave has each juggler moving forward in the middle, and back on  
the ends. Move to the next position after each pass. See the Standard Weave for  
more details concerning movement.

In this version jugglers pass short throws in the middle and long throws on the  
ends. As always, watch the lead throws!  
  
### Invert Prevert Weave (Equidistant Weave)  
  
One team is inverted (which must mean the other team is preverted). Team DEF  
does an inverted weave by moving forward on the ends and backwards in the  
middle. This is an easier weave than the standard weave if all passers are  
comfortable with both standard and inverted weaves and looks nice because each  
juggler in a pair stays the same distance from the other.  
  
![](./media/image69.png){width=30%}  
  
### Cross-Corner Weave (Kitty-Korner Weave)  
  
Same as the standard double weave, but pass to the opposite corner on the ends

### Dresser Drawers Double Weave  
  
Either, both weaves do Dresser Drawer style (see 4-person patterns), or they do that plus  
adding 3 clubs, as described here. Both teams do the Dresser Drawers weave. All passes are right hand doubles (like 7 2-count). Each weaver passes to only  
one other weaver (like in standard double weave) in a 6-count. The leads are  
very important.  
  
| \*\*Juggler/beat\*\* | \*\*1\*\* | \*\*2\*\* | \*\*3\*\* | \*\*4\*\* | \*\*5\*\* | \*\*6\*\* |  
|-------------|-------|-------|-------|-------|-------|-------|  
| \*\*A\*\* | D-D | | | | | |  
| \*\*B\*\* | | | D-E | | | |  
| \*\*C\*\* | | | | | D-F | |  
| \*\*D\*\* | | D-B | | | | |  
| \*\*E\*\* | | | | D-C | | |  
| \*\*F\*\* | | | | | | D-A |  
  
> \* Both hands counting  
> \* A, B and C start with right hand  
> \* D, E and F start with left hand

### Switch Sides Double Weave  
  
Switch sides at each end. For example, after A and D pass at the end, they  
switch positions so that A, E, and F are weaving, as are D, B, and C.  
  
When was this pattern created? We have been doing it since 1993.

### Double Gandini Weave  
  
The Standard Gandini Weave makes a very nice double weave too. Each weaver  
passes twice in a row to two different jugglers, and then has 4 selves to move  
out, around back and into the middle. Next time move out in the opposite  
direction.  
  
| \*\*Juggler/beat\*\* | \*\*1\*\* | \*\*2\*\* | \*\*3\*\* | \*\*4\*\* | \*\*5\*\* | \*\*6\*\* |  
|-------------|-------|-------|-------|-------|-------|-------|  
| \*\*A\*\* | | | | E | F | |  
| \*\*B\*\* | | D | E | | | |  
| \*\*C\*\* | D | | | | | F |  
| \*\*D\*\* | C | B | | | | |  
| \*\*E\*\* | | | B | A | | |  
| \*\*F\*\* | | | | | A | C |  
  
> \* Right-hand counting  
  
For a good time, call Melonhead. Or try this pattern in chocolate bar.  
  
Another nice variation is to add an extra club and make all the passes in the middle right hand doubles.  
  
Based on Gandini Weaves by Gandini Juggling Project and MAJ.

### Double Gandini Weave Plus  
  
There is so much time at the back end of the Double Gandini Weave! Nine self  
throws! There must be something to do in all that time. Wait, I know! Let's add  
another club!  
  
This is the same as the previous pattern with a triple club passed back and  
forth over the top of the pattern. It's a spectacular pattern and not as hard as  
you might think (though certainly not easy).  
  
| \*\*Juggler/beat\*\* | \*\*1\*\* | \*\*2\*\* | \*\*3\*\* | \*\*4\*\* | \*\*5\*\* | \*\*6\*\* |  
|-------------|-------|-------|-------|-------|-------|-------|  
| \*\*A\*\* | | T-F | | E | F | |  
| \*\*B\*\* | | D | E | | | T-E |  
| \*\*C\*\* | D | | | T-D | | F |  
| \*\*D\*\* | C | B | | | T-B | |  
| \*\*E\*\* | T-A | | B | A | | |  
| \*\*F\*\* | | | T-C | | A | C |  
  
> \* Right-hand counting  
  
Pattern by Luke Emery.

### Stick on the End Double Weave  
  
Two teams of weavers pass to each other while weaving: moving back on the ends,  
forward in the middle, starting positions as in the Standard Double Weave. All three opposing pairs  
pass simultaneously. In order for this to work,  
pass twice (on base count) while in the end positions, and pass once while in the middle.  
Weavers pass in 6-count in the standard version, but since they're in sync you can  
easily do other counts. 4-count is pretty tough, but 5-count is fun!  
  
| | |  
|------------|------------|  
| ![](./media/image72.jpeg){width=60%} | ![](./media/stickontheendtable.png){width=30%} |  
| movements | right-hand counting |  
  
In the figure above, lines indicate passes, numbers indicate the passing beat,  
and arrows indicate movement after the pass. So starting out Jugglers A and F are stickers.  
  
Note: If each side moves on the edges and middle of a rectangle, instead of  
weaving, we have the essence of Han's Delight. \[Euro '98'\].

When was this pattern created? We have been doing it since 1993 (when we did it in Tripp Commons with Matt Henry!).  
  
### Five Person Weave (Peter Feeds Five)  
  
This is a fun moving pattern that's pretty simple but mentally tough for beginners, since the count  
changes as you move through the weave. The local rule is pass to Peter (the feeder) then move to the  
next spot. If you're in an odd spot, then you move back away from Peter and \*with the grain\* (i.e. in the  
same direction as Peter's sweep); if you're in an even spot then you move forward and \*against the grain\*. You end up passing more frequently in the middle and less frequently on the ends.  
  
| \*\*Juggler/beat\*\* | \*\*1\*\* | \*\*2\*\* | \*\*3\*\* | \*\*4\*\* | \*\*5\*\* | \*\*6\*\* | \*\*7\*\* | \*\*8\*\* | \*\*9\*\* | \*\*10\*\* |  
|-------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|  
| \*\*A\*\* | F | | | | | | | F | | |  
| \*\*B\*\* | | F | | | | | | | F | |  
| \*\*C\*\* | | | F | | | F | | | | |  
| \*\*D\*\* | | | | F | | | F | | | F |  
| \*\*E\*\* | | | | | F | | | | | |  
| \*\*F\*\* | A | B | C | D | E | C | D | A | B | D |  
| | \*\*11\*\* | \*\*12\*\* | \*\*13\*\* | \*\*14\*\* | \*\*15\*\* | \*\*16\*\* | \*\*17\*\* | \*\*18\*\* | \*\*19\*\* | \*\*20\*\* |  
| \*\*A\*\* | F | | | F | | | | | | |  
| \*\*B\*\* | | | | | | F | | | F | |  
| \*\*C\*\* | | | F | | | | | | | F |  
| \*\*D\*\* | | | | | | | F | | | |  
| \*\*E\*\* | | F | | | F | | | F | | |  
| \*\*F\*\* | A | E | C | A | E | B | D | E | B | C |  
  
> \* Right-hand counting  
  
![](./media/image73.png){width=50%}  
  
When was this pattern created? We have been doing it since 1998.

### Spiral  
  
Peter and Luke have complained that this shouldn't be called a Spiral, but that's what we call it! It's sort  
of a weave, but there are three loops instead of two. And you pass at the faces of the loops instead of on the edges. The standard version has weavers in 6 count (two doing every third rights and two every third lefts) and feeders in 3 count.  
  
  
| | |  
|------------|------------|  
| ![](./media/image75.png){width=50%} | ![](./media/spiraltable.png){width=35%} |  
| positions | |  
  
  
> \* Right-hand counting Fast Spiral Weave [weavers 4-count; feeders 2-count]  
> \* 3-Count Standard Spiral Weave [weavers 6 count; feeders 3-count]  
> \* double 3 Count Hyper-Spiral Weave [not sure if we ever got this to work!]  
  
Refer to the graph above to follow A's path through the pattern. A's first pass  
is to E. A then turns around and moves to the bottom of loop 1 where a pass is  
made to F. A turns and moves to the top of loop 1 to pass to E. A turns and  
moves to the bottom of loop 2 to pass to F. A turns and moves to to the top of  
loop 3 to pass to E. A turns and moves to the bottom of loop 3 to pass to F. A  
turns and moves to the top of loop 2 where the pattern started.  
  
Jugglers A, B, C, and D all do the same thing on pass out of phase. If the  
numbers show right hand counting this is the Fast Spiral and the weavers have a  
4-count to move between each position. This is very fast.  
  
To slow the pattern to 3-count, change the column numbers in the table above  
from 1, 2, 3, 4 to 1, 4, 7, and 10, and change "Right-hand counting" to "Both  
hands counting, right hand starts". The weavers will pass in 6-count (note that  
2 weavers, A and C are passing left handed 6-count).  
  
Still too fast? Change the column numbers to 1, 3, 5, and 7 with right hand  
counting (weavers in 8-count).  
  
Like many patterns, Spirals can be stacked, where one of the feeders is replaced  
another Spiral with the original feeder moved to the other side of the  
additional Spiral.  
  
To red line this pattern have the feeders throw double 3 count, but keep the  
same passing order. Now the weavers are all in 3-count. The Hyper Spiral should  
be enough to challenge the most jaded of weavers!  
  
  
Pattern by Mike Newton and MAJ.

### Standard 5-Weave  
![](./media/image76.jpeg){width=50%}  
  
The standard weave for 1 feeder and 5 feedees has each feedee in 10-count (every  
5<sup>th</sup> right) and the feeder in 2-count. Each weaver passes once on the  
end, moves backwards and inside, then passes once in the middle, and moves  
forwards and outside to the other end. A 10-count sound very slow, but I think  
you'll find most weavers will not be bored at all trying to keep up.  
  
Once it starts, it's pretty easy to keep going. The start is a bit different  
from the standard weave for 3. The first weaver who passes in the middle goes to  
the opposite side of the first outside pass.  
  
1. A ‚Äì B end (B goes back on the end)  
1. A ‚Äì C middle (C move slowly forward and to their right)  
1. A ‚Äì D end (D goes back on the end)  
1. A ‚Äì E middle (E moves forward and to their left)  
1. A ‚Äì F end (F moves slowly left before the pass, then back on the end)  
1. A next passes to B in the middle (as B is moving to their right) and  
 continues passing to each weaver in order, but in the next weave position.  
  
All of the weave variations can be done in a 5 Weave too. For added fun and  
excitement try a double weave of 2 standard 5 weaves, or 5 weave opposite a 3  
weave, or a 5 weave opposite a Gandini Weave and so on.  
  
Also see Twister 5 variations.  
  
Pattern by MAJ.

### Gandini 5 Weave  
  
  
  
| | |  
|------------|------------|  
| ![](./media/image77.jpeg){width=45%} | ![](./media/image78.jpeg){width=45%} |  
| start | go |  
  
  
In this weave all the weavers move in a figure 8, but they always pass from the  
middle instead of the end.  
  
The feeder is in 2-count (every right hand pass), the feedees are in 10-count.

| \*\*Juggler/beat\*\* | \*\*1\*\* | \*\*2\*\* | \*\*3\*\* | \*\*4\*\* | \*\*5\*\* |  
|-------------|---------|---------|---------|---------|---------|  
| \*\*A\*\* | B | C | D | E | F |  
| \*\*B\*\* | A | | | | |  
| \*\*C\*\* | | A | | | |  
| \*\*D\*\* | | | A | | |  
| \*\*E\*\* | | | | A | |  
| \*\*F\*\* | | | | | A |  
  
  
It's easiest to start with the weavers stacked in a line all facing the feeder.  
Then each weaver will pass once and move in the opposite direction of the weaver  
in front of them.  
  
Try all the same variations for the Standard Weave and Gandini Weave, and  
alternate counts such as 2 of 3 count. You can also invert the weave (reverse  
cascade). Also see Appendix C.  
  
We learned about this family of weave variations from juggling with Sean Gandini  
and the Gandini Juggling Project in 2000.

### Twister 4 Weave  
  
Twister Weaves can be done with any number of jugglers. Here's a twister weave  
for 6.  
  
  
| | |  
|------------|------------|  
| ![](./media/image79.jpeg){width=30%} | ![](./media/twister4weavetable.png){width=50%} |  
| positions | right-hand counting |  
  
  
Pattern by Luke Emery.

### Foie-Graham  
  
This is an intense off-set double-weave for six jugglers. As you enter an \*outside\* loop of your weave  
you do \*pass-self-self\* (right-hand counting) as usual for a weave. But as you enter the other loop, the \*inner\* loop, you make a series of 4 passes, starting and ending with the same person, and getting the other two in  
between. It takes advantage of the fact that coming out of the middle on a weave you are in front of  
your other weavers, and so can get some extra passes in before going to the backside of the weave loop.  
The position graph, on the left below, shows the 12 spots of a standard weave, duplicated and offset  
to configure the pattern. Blue arrows indicate moves after each beat, with the starting configuration  
shown. The pass graph, on the right, shows where passes happen (green) in the 12-beat cycle.  
(Thanks Conner for the pattern name!)  
  
![](./media/foiegraham.png)  
  
Pattern by Graham Paasch.

## **Extra Club Moving Six Person Patterns**

### Extra-club Double Weave  
  
Set up a standard double weave, but have one juggler with an extra club. Passing beat  
stays at 6-count; moving stays the same (figure eight), but the passes have to be doubles.  
Importantly, you receive from one juggler then pass to another, in order to retain the 7-club-style  
passing. Lead deeply on the ends and short and lofty in the middle.

## 

# **Seven Person Patterns**

## **Stationary Seven Person Patterns**

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## **Extra Club Stationary Seven Person Patterns**

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## **Moving Seven Person Patterns**

## 

## **Extra Club Moving Seven Person Patterns**

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## 

# **Patterns for an indefinite number of jugglers!**

…an idea whose time has come…like

# **Pattern Statistics**

# 

# 

| **Pattern** | **N**  **Jugglers** | **N**  **clubs /**  **J** | **PBJ** | **N moves /**  **cycle / Jug** | **N**  **rotations /**  **Cycle / jug** | **SD ?** |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
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