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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](#). You may access the book [online](#), or check the latest updates at our [GitHub repository](#).



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.

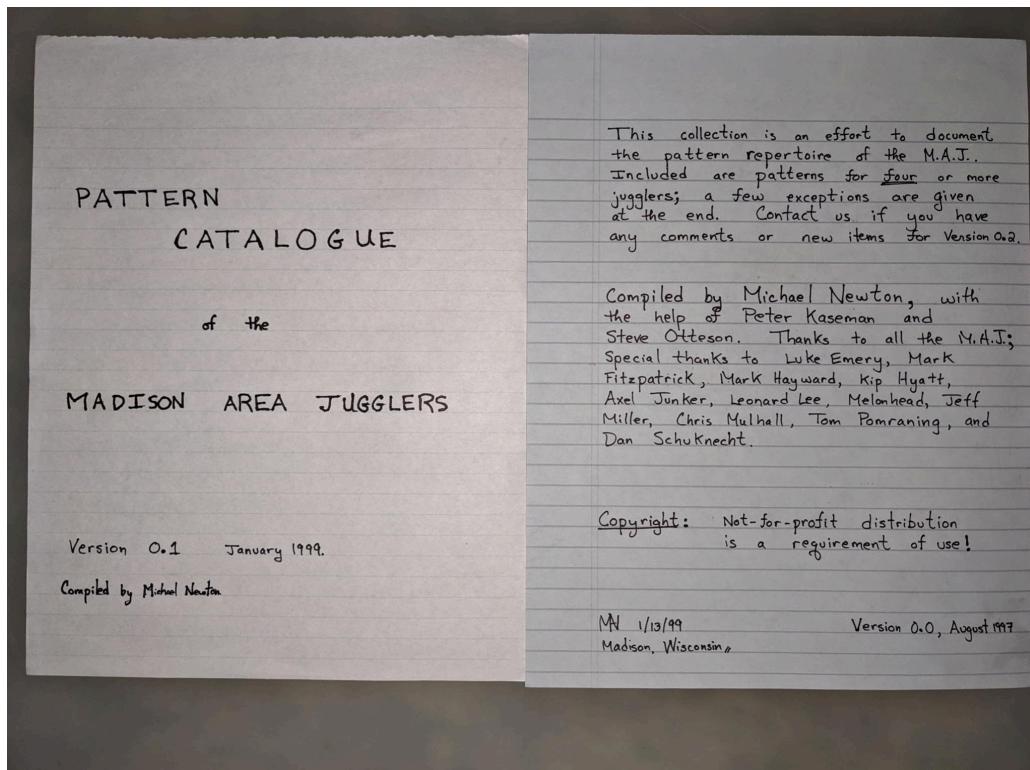
All along the editors have had substantial input from the Madison Area Jugglers and friends, and we are indebted to them for helping enhance this collection. Club passing is a social pastime that needs a group of similarly inclined jugglers. Many of these patterns are inspired by other jugglers and patterns 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, simulz, 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

		Beat, base count					
		Juggler	1	2	..	N-1	N=Length of cycle
LAYOUT <i>where the jugglers are in space</i>	A						
	B						
	...						
	Last juggler						
<ul style="list-style-type: none"> ● Helpful comment #1 ● Helpful comment #2, ● ... 							

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).

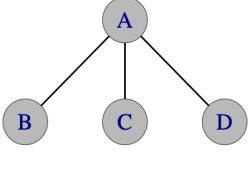
Typically passes happen on the named count, though not every juggler may be passing. And we may have time steps (beats) on that named count where no-one is passing. Patterns can be described in different base counts; often when learning a more complicated pattern we start with a slow base (e.g. 6 or 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)

Juggler	Beat, both hands counting					
	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.

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					

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 (2nd 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. (Or, 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?".

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!)

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 Schuchnec.

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.

spinnyness. 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!). E.g, weave has spinnyness 0; twister weavers experience spinnyness 4π . (You can always add spinnyness by doing pirouettes.)

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

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 J : 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 CJ : 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: L : number of counting beats (base count or whatever named 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 PBJ : 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 corresponding to more difficult patterns, usually! This number 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!)

Other Jugglers OJ : 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!

Throw Heights per Juggler THJ : 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).

Juggler Unit JU : 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 . It's 6 to 8 feet, or so (in earth's gravity). By our calculations, two jugglers standing side-by-side as feedees in a pattern are about $\frac{1}{2}$ 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 $1/\sqrt{2}$ JU apart (i.e. a bit more than in a stationary feed), in order to have room to move, for example.

Spinnyness: A measure of how much turning you do to complete a juggling pattern, reported in total angle traversed through the pattern (ignoring changes in direction), and measured in radians (because we've always liked radians better than degrees)! An ordinary *weave* has

spinnyness 0 (because weavers can proceed without changing the direction they face), but a *twister* weave has spinnyness 4π for each of the 3 weavers because each mover changes direction 4 times to get back to the start. *****something about omegabar and the turbo?!!*** We suppose that stationary patterns have spinnyness zero because we think of this spinnyness as a property of a juggler's role in a moving pattern; we do not attempt to measure actual spinnyness in stationary patterns, many of which depend on an effective rotation while staying put (e.g., think of passing in a *feast*). *****connect with selves per turn*****

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., π 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 spinnyness 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:

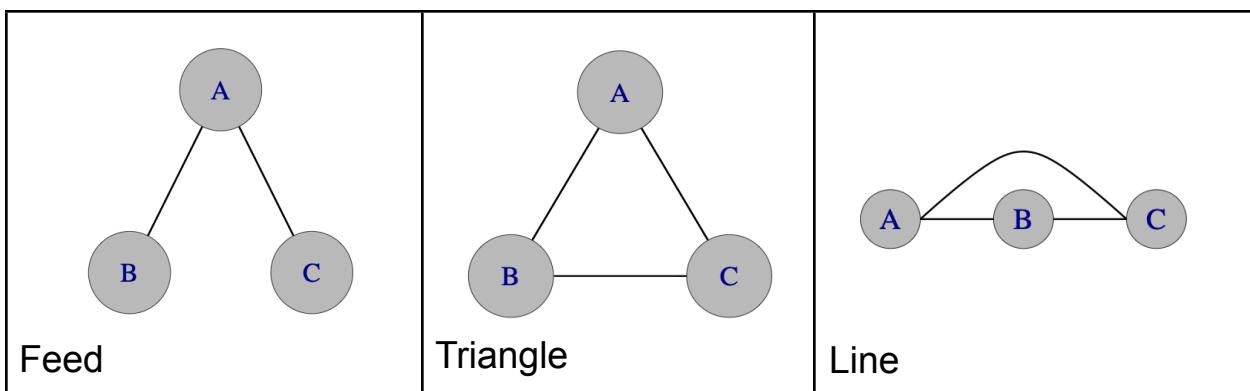
- [Flying Karamozov Brothers](<http://www.fkb.com/>)
- [Gandini Juggling Project](<http://www.gandinijuggling.com/>)
- [Martin Frost's Youtube channel](<https://www.youtube.com/user/elgra2>)
- [JiBe's passingDB site](<https://www.passingdb.com/>)
- [International Juggling Association site](<http://www.juggle.org>)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

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.



- 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. It's a great building block for all kinds of other patterns.

Beat, right hand counting		
Juggler	1	2
A	B	C
B	A	
C		A

feeder
feedees

```

graph TD
    A((A)) --- B((B))
    A --- C((C))
  
```

Many variations, e.g.: left handed, chocolate bar, feeder in double 3-count (and feedees in 3-count), or Tom's (which is 3 passes in a row to each feedee with no selves for the feeder). Here's a variation that's been popular in Madison since Version 3.0.

Ryan's Feed

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

```

graph TD
    A((A)) --- B((B))
    A --- C((C))
    B --- C
  
```

- <https://jugglingfan.org/pmwiki/pmwiki.php?n=Patterns.RyansFeed>
- Think 1-5-8 and 3-6-7 for the two feedees.
- Variation: Inverted version has **B** and **C** swap
- Variation: Change side and turbo variants [see ahead]

Rotating Feed (i.e. Feast for 3)

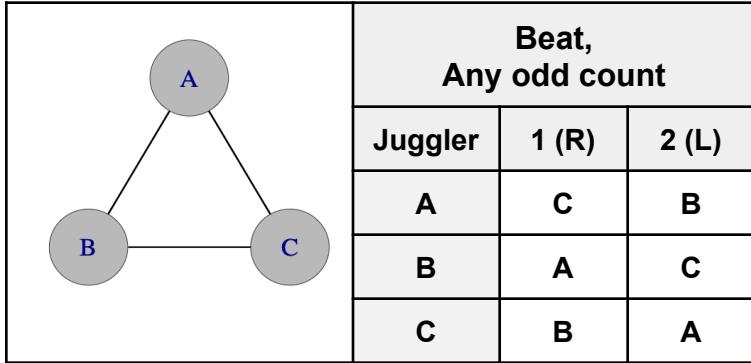
Beat, right hand counting			
Juggler	1	2	3
A	B		C
B	A	C	
C		B	A

```

graph TD
    A((A)) --- B((B))
    A --- C((C))
    B --- C
  
```

- I.e. Everyone feeds everyone else, hence the name
- This feast is clockwise from above
- **Variations:** change count (e.g. 4 count easier; odd counts fun); go counterclockwise

Basic Triangle



- When on 3-count base, this is a default pattern for 3 jugglers in Madison (almost as popular as basic feed!)
- **Variations:** changing the count, making it odd, maintains the pattern but slows it down; as written the throws are the preferable inside triangle throughs; switching **B** and **C** gives outside throws, which seem harder for most jugglers owing to wide angles
- **More variations:** Stay on even count, restrict to rights only (or lefts only) and just do **A->B->C**, (i.e. take one column; cycle of length

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	C	B	
B	A	C	C	A	A	C	A	C	A	C	
C	A	B	A	B	A	A	B	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.

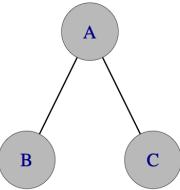
I recommend that feeders call out what they are doing (right-left or left-right) so that the next feeder will know what to do. This will also help every juggler know what is going on.

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.

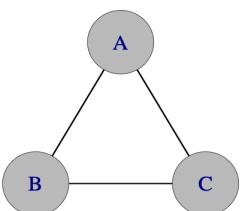
Puzzle Feeder



		Beat, both hands counting												
		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			

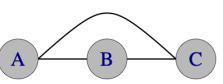
- Right hand starts
- **A** is the feeder, and **B** and **C** are doing the 2-person *Three Piece Puzzle* pattern six throws out of phase.
- *Three-Piece Puzzle* and *Puzzle Feeder* patterns are by Jim Brennen
- Steve Otteson in the mid-90's promoted this pattern; but it's not juggled frequently

Puzzle Feast

	Beat, both hands counting												
	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	

- Both hands counting, right hand starts
- All 3 jugglers are doing what the feeder did in *Puzzle Feeder*.
- *Puzzle Feast* is by Steve Otteson

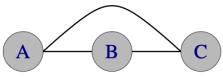
Mel in the Middle

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

- A double 3 count pass feed with a moving juggler in the middle spinning around.
- If Mel is B (Mel is always **B**), and starts facing **A**, then it is as above.
- **Variation:** slow it down or don't spin every time

Peter's Backcrosses

		Beat, 3-count base	
Juggler		1 (R)	2 (L)
A	B	C	
B (Peter)	C	A	
C	A	B	

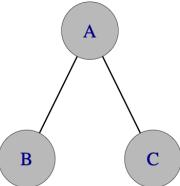


- All jugglers are in 3-count (or a slower odd count, like 5 count)
- Notice that **A**'s rights have to be lofty over **B**'s selfs: ditto for **C**'s lefts
- **A**'s lefts (likewise **C**'s rights) go behind Peter, who is facing down [relative to layout above]
- **Variation:** 1-count...only a dream

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 ?

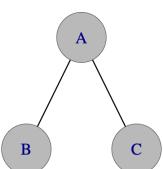
Extra Clubs Stationary Three Person Patterns

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)

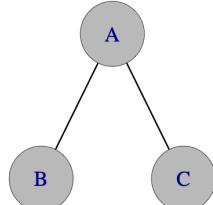
		Beat, both hands counting				
Juggler		1	2	3	4	5
A	d-B			d-C		
	B		t-self		d-A	
	C		d-A			t-self

- **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

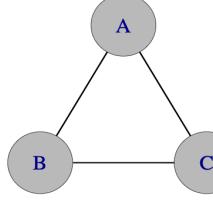
Extra clubs chocolate bar feed (one variation)

	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!

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

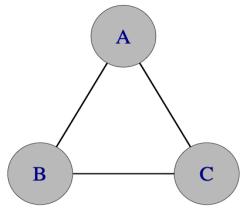
	Beat, both hands counting									
	Juggler	1	2	3	4	5	6	7	8	9
	A	d-B		d-C		d-C		d-A	pause	
	B		d-A		d-B	pause		d-C		d-C
	C	d-C	pause		d-A		d-B		d-B	

- 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		

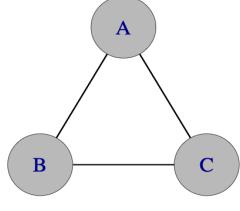


- Jugglers start in sync with right hands; **A has 4**
- All passes double spin crossing passes

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

11 Club 2 of 3 Count Triangle

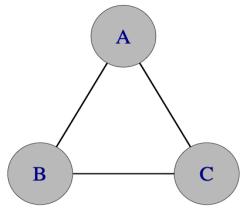
		Beat, both hands counting			
		Juggler	1	2	3
A		dx-C	dx-C		
B		dx-A			dx-A
C			dx-B	dx-B	



- 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	



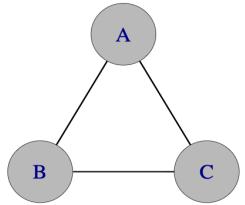
*A-level pattern!

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

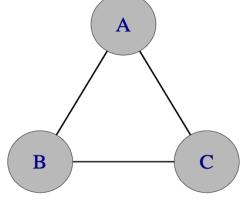
		Right hand counting		
Juggler		1	2	3
A	t-C	B	C	
B	C	A	t-A	
C	B	t-B	A	



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

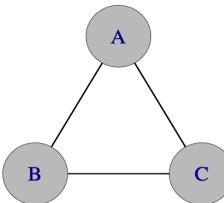
6-Count Popcorn Triangle

		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

Diagram: 		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** |

- > * Both hands counting
 - > * A starts with 4 clubs, right hand
 - > * B starts facing A, right hand
 - > * C starts with left hand
 - > * $\frac{1}{2}$ P marks half pirouette underneath the double
 - > * 1 is the same as 11. This is just one possible variation of spinning underneath popcorn.

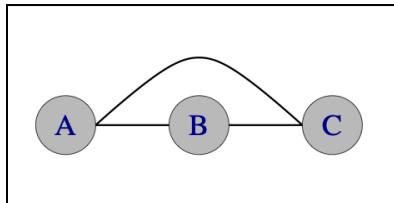
Swiftly Tilting Popcorn

****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
 - $\frac{1}{2}$ P marks the half pirouette underneath the double
 - 1 is the same as 11??

Line Variations



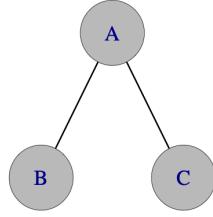
- **Dropback Line:** **A** passes to **B**. **B** drops back to **C**. **C** passes to **A**. You can do a dropback line in any count: 2-count, 4-count, 3-count, chocolate bar. It's a nice pattern to add clubs to as well. Try one two, or 3 extra clubs with doubles or one extra club in 3-count (**A** 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
	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 [Jugglloid](<http://jugglloid.com/editor/?s=yhIKp1>)

Moving Three Person Patterns

Now for some moving patterns.

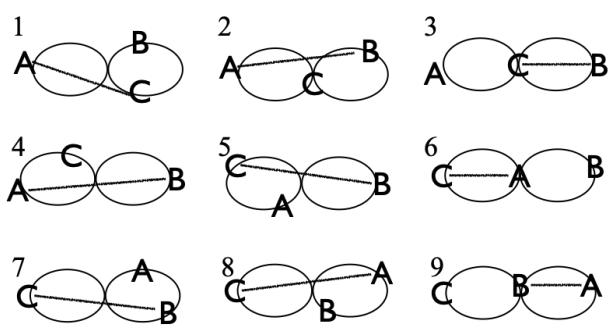
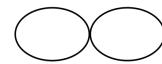
-change side feeds **discuss this is the first moving pattern, but we don't describe it super carefully**

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 Clover* 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)

	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 *E/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 <http://juggloid.com/editor/?s=npRW7I>

Metrics: CJ=3, OJ=2, PBJ= $\frac{1}{3}$ (standard); **put in for Tom's etc** spinnyness=**, distance=**, cycle=18

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

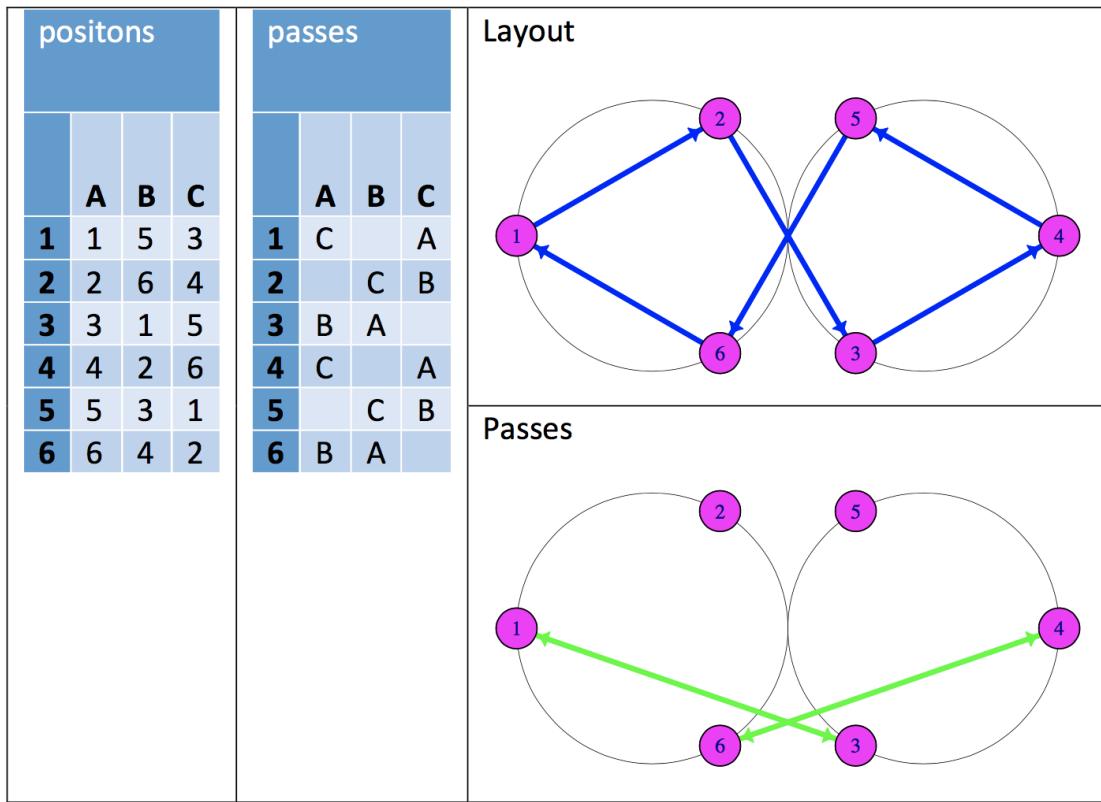
[PassingDB](<https://www.passingdb.com/patterns.php?id=49>)

$2\pi/3$

PUT IN TURBO-LIKE FORMAT

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. There are three moving jugglers, **A**, **B**, and **C**, and six passing beats for a full cycle: (on count of choice; rows of tables). Everyone moves through the figure eight; in contrast to a Turbo or Bruno's nightmare, there is not a feeder being swapped here; all folks are moving all the time. Four count is fun; three 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 (in this layout, positions 2 and 5) where you can plug in any other juggler or pattern that matches that count (including three other jugglers doing a $2\pi/3$). Looks like two pies when viewed from above, and it's 3 jugglers. Plus, each circle in the layout is divided into

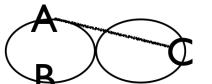
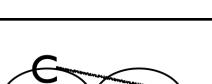
3, hence the name. Prof Mike invented $2\pi/3$ in summer 2017.



Chiral variants: In the original version (as described above), the juggler in the back position (either 1 or 4) passes to a front position on the opposite side (either 3 or 6), after which the front-position juggler moves toward the back of their respective pie. Likewise, the juggler who's on their phantom at the start (e.g., **B** above) moves across and turns into the opposite pie. Alternatively (i.e., if we would make passing arrows between positions 1 and 5 and also 4 and 2 instead), the receiver on the side with two-jugglers to start would receive and move through. This alternative version has become the standard start [i.e., pass and move across, when you're starting on the side with two]. They're similar but slightly different patterns! Here's the popular, chiral version, in the same format as for the *turbo*.

2π on 3 (chiral version)

passes and positions (another view)

Jugglers				locations/passes
Beat	A	B	C	
1	B	A		
2	C		A	
3		C	B	
4	B	A		
5	C		A	
6		C	B	
7=1; 6 beats is full cycle				

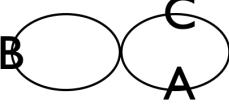
Extra Club Moving Three Person Patterns

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 $\frac{1}{2}$ 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.

****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

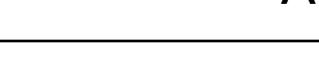
- > * Both hands counting
- > * A starts with R
- > * B and C start with L
- > * D-self is a half pirouette

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

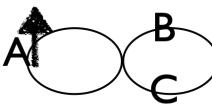
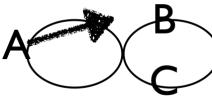
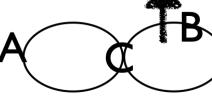
Jugglers				locations/passes
Beat	A	B	C	
1	t-C			A 
2	B	A	t-A	A 
3	t-C	move		B 
4	move		t-B	B 
5	C	t-C	A	B 
6	move		t-B	B 
7		t-A	move	B 
8	t-B	C	B	B 
9, then 10=1		t-A	move	C 

- **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.

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)

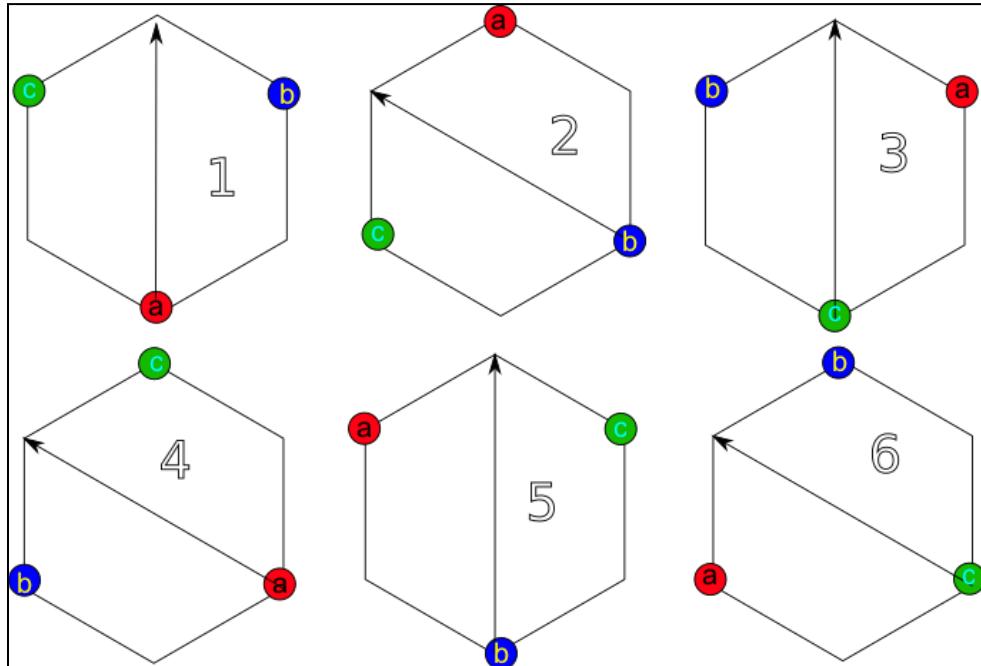
Laura's Weave: passes and positions				
Jugglers			locations/passes	
Beat (right hands)	A	B	C	
1	t-self			
2 (start)	t-B			
3		t-self		
4		t-C		
5			t-self	
6			t-A	

Mel's variations of $2\pi/3$ varies when you cross...lengthens cycle

Laxative

This one makes you *go go go*, hence the name. It's dynamic, simply-structured 3-person moving pattern, in which everyone is synced up and passing on the same odd count. Because of the constant movement, the to-from passes never change. Referring to the figure, red (a)

always passes to green (c), who always passes to blue (b), who always passes to red. The movement and the odd-count allows that all these passes are inside-triangle passes. 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! Notice there are 6 total passing beats, during which each juggler traverses the 6 positions, though the local cycle 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.



[./media/laxative/3j.png](#)

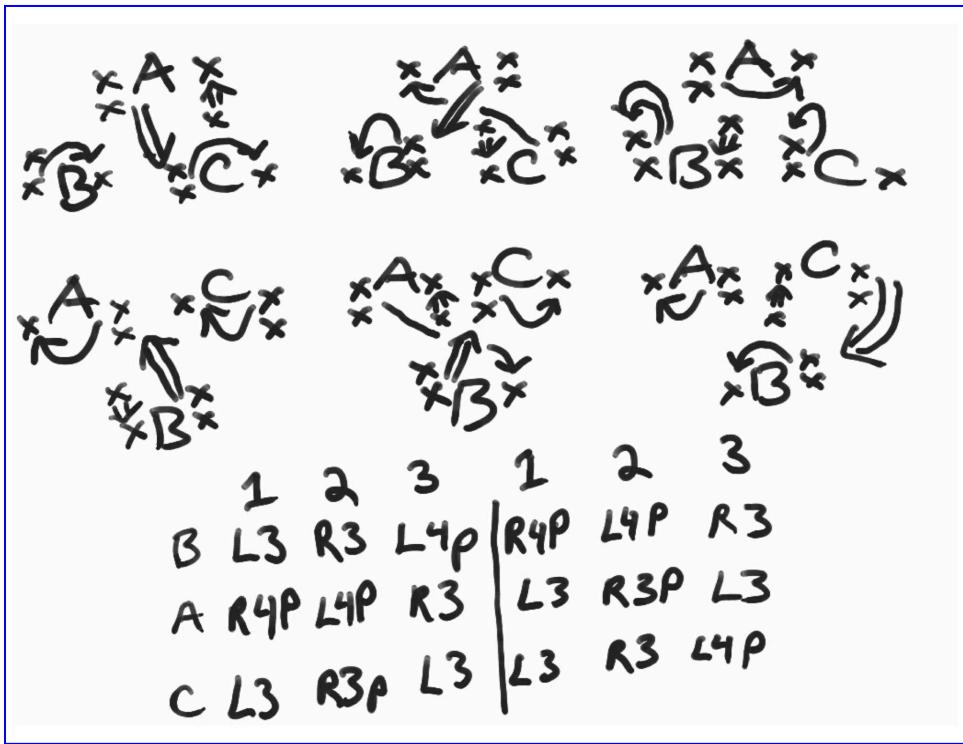
Pattern by Prof Mike, sometime after 2018. Frequently juggled by Mike (c), Mel (b), Conor (a) or Mike (c), Mel (b), Nathan (a) [who performed it at Madfest 2025]

Pattern Metrics: J=3, PBJ=1/count, ****something about in-out not equal to out-in****

Graham's 3 stuff

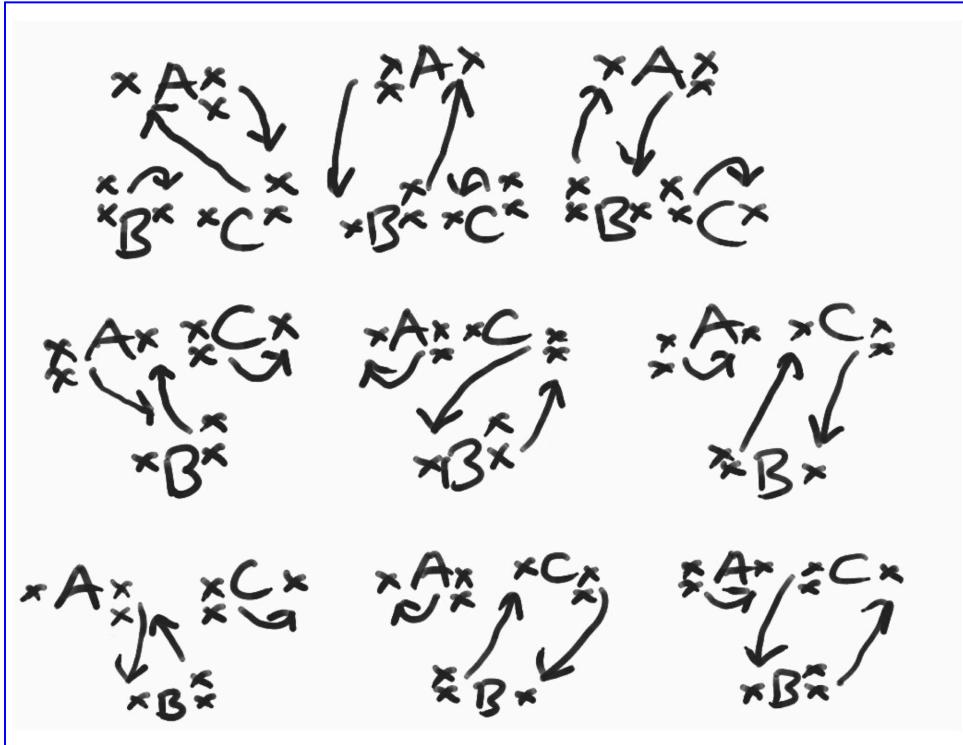
Here are some challenging patterns for 3 jugglers by Graham Paasch.

Change Sides Double-3 Count Feed Plus



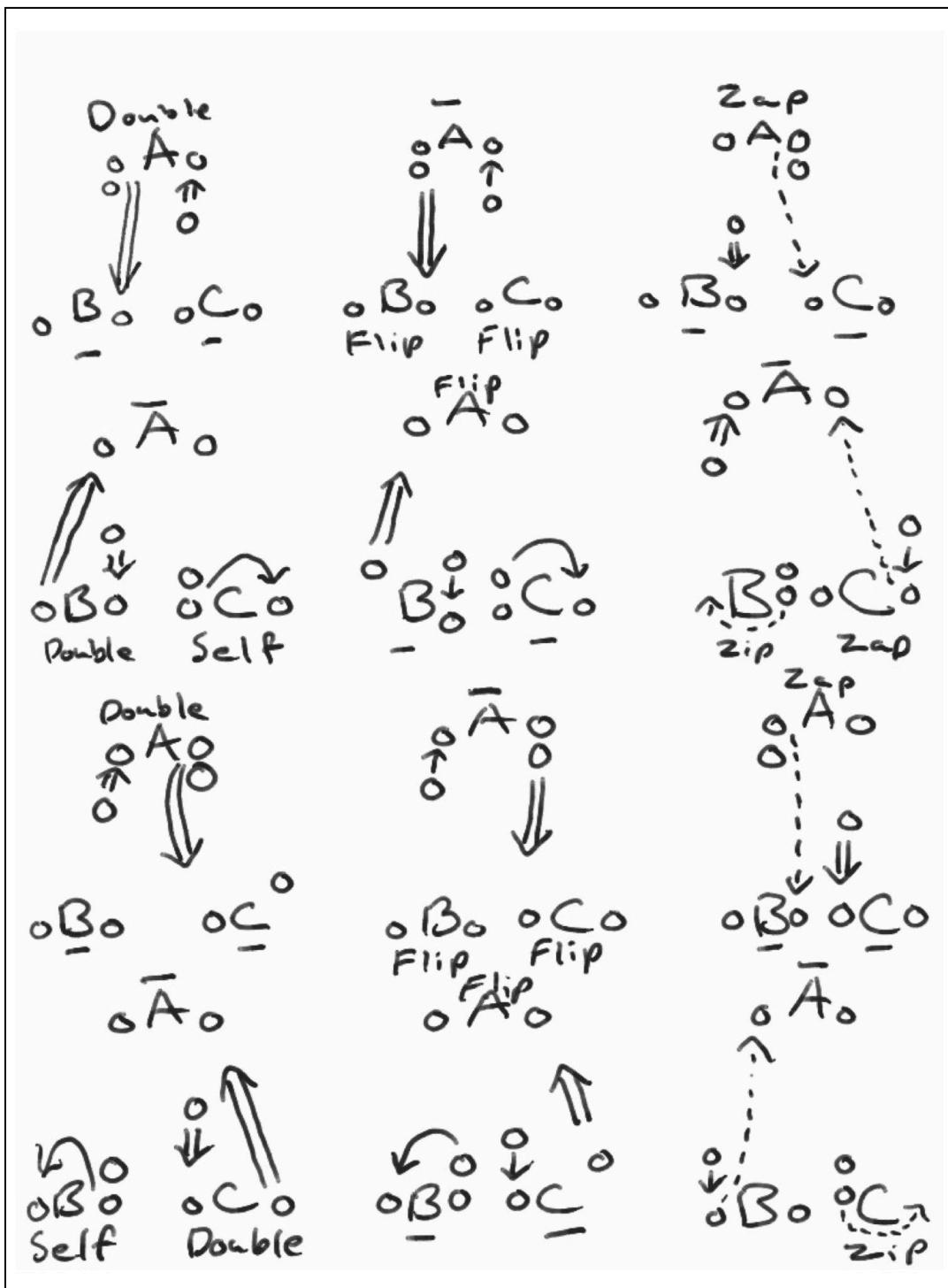
[./media/ChangeSidesDouble3FeedPlus.jpg](#)

Change Sides RRLRLRLLRLRL



[./media/ChangeSidesRRLRLRLLRLR.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).

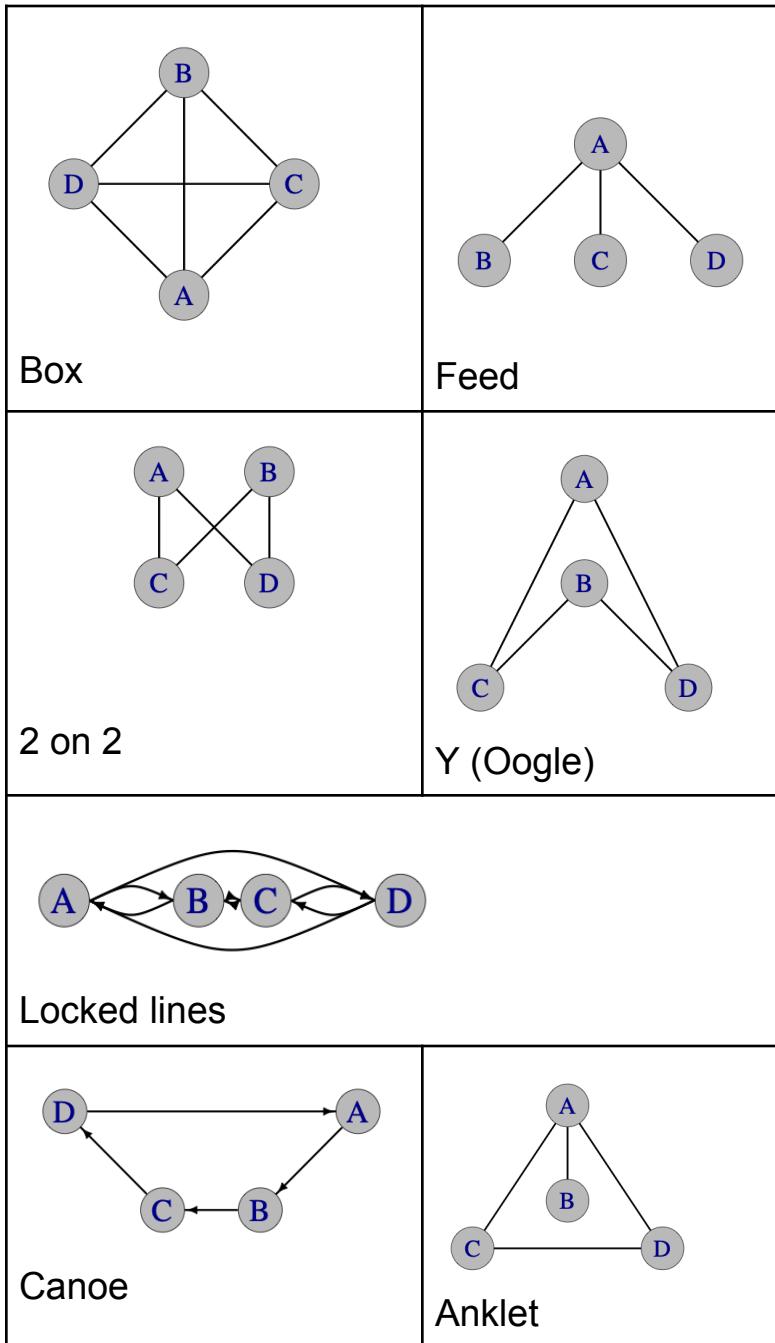
Turbo Variant

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



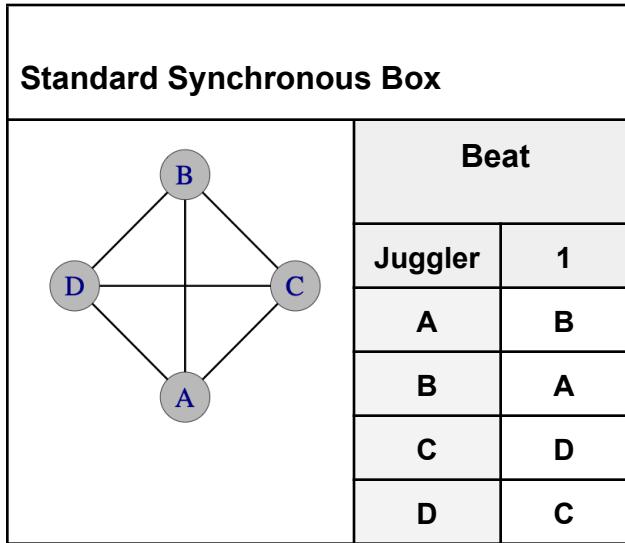
- Edges in each graph indicate possible exchanges between the jugglers. We sometimes call these *who-passes-to-whom* graphs (average degree is the *partners* metric), but they also encode spatial arrangements.
- Think upside down to see the Y shape among the juggler positions!
- *comment on A-B pass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



- 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

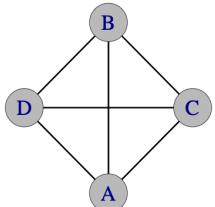
the right-handed version!), and releases their double straight pass just after that next-spot juggler so that the clubs cross passing lines in an orderly fashion. With the right-handed version, **A** starts and passes a double to **B**; then at about a $\frac{1}{4}$ beat, **D** passes a double to **C**; 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 $\frac{1}{2}$ 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.

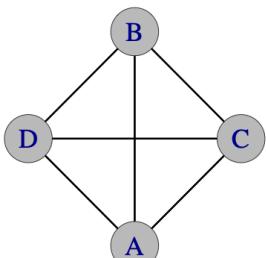
Rotating feed (4 person)



	Juggler			
Beat	A	B	C	D
1	D			A
2	B	A		
3	C		A	
4			D	C
5		C	B	
6	B	A		
7		D		B
8			D	C
9=1	D			A

- 12 clubs
- Rotating feed (both directions work; left-right from feeders perspective is shown)
- Beat is preferred count (often a right-hand 2-count base)
- **A** starts the feed
- Rule: last feedee becomes next feeder
- With this version, the feeder position quietly circulates counter clockwise, even though each feeder is sending passes clockwise
- An ancient pattern!

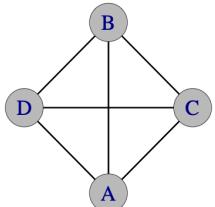
Feast (4 person)



Juggler	Beat			
	1	2	3	4
A	D	B	C	
B	C	A	D	
C	B		A	D
D	A		B	C

- 12 clubs
- Everyone feeds everyone else (hence the name!)
- Include yourself in the count
- This version is clockwise (from above); counterclockwise works too.
- Any agreeable count works.
- 4-count is nice for rookies
- This pattern is a notch harder than the asynchronous box because you have to swivel through 90 degrees during each cycle.
- *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



	Beat (both hands counting)			
Juggler	1	2	3	4
A	B	C	D	
B	C		A	D
C	A	D		B
D		A	B	C

- 12 clubs
- Jugglers start with 2 clubs in the right hand.
- Pattern by Laura and Becky Provance, Barry Friedman, and Steve Otteson.

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		

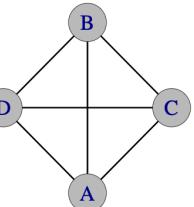
	D		d-A		t-B
<ul style="list-style-type: none"> • 15 clubs (3 extra) • Both hands counting, passes with rights • A and C start with right; B and D start with left • A, B, and C start with 4 clubs • Check with Luke on origin and start for B; is this coded correctly? Seems like triples should cross and 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?**

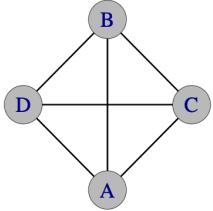
Extra club rotating feed (for 4 jugglers)



	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

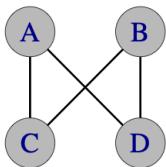
- 1 extra club rotating feed (both directions work)
- Beat in table is both hands counting
- All throws are right hand doubles (unless you do the opposite version with all throws being lefts)
- **A** starts with 4 clubs
- **A** and **B** start with right hand
- **C** and **D** start with left hand
- The steady state right hand sequence is pass across, pass left, self, pass across, self.
- Right-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

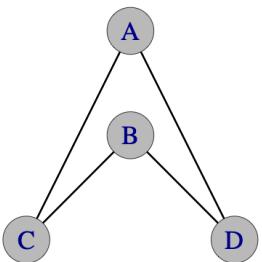
Two on Two Double Three Count



	Beat (both hands counting)		
Juggler	1	2	3
A	C		D
B	D	C	
C	A	B	
D	B		A

- 12 clubs
- Both hands counting; right hand starts
- This is the left-to-right feed version; other versions ok too
- This is a prerequisite for *EI Nino* or *La Nina*
- Dates to July 1997 in MAJ, but maybe earlier by others
- PBJ= $\frac{2}{3}$; partners=2; cycle=3

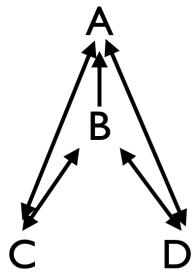
Y (oogle)



Juggler	Beat	
	Right	Left
A	C	D
B	D	C
C	B	A
D	A	B

- 12 clubs
- On whatever count you like, proceed as above
- Eg, 4 count rights would use only column 1, but 3-count would use both
- **B** has to relax as they receive crossing throws from the opposite person than they pass to.
- **C** and **D** have to take care with long passes to **A** and carefully lofty passes to **B**.
- This stationary Y is the basic building block for the *Oogle Boogie* moving patterns

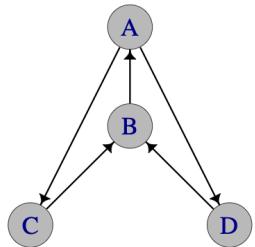
Luke's Oogle



	Beat (3-count base)			
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

- 12 clubs, 3-count, start right-handed
- **B**'s passes to **A** are drop backs!
- Variation: slow to 5-count; rotate through multiple configurations like the *Oogle Boogie*, perhaps doing 4 passes per position, then 2 phantoms to move.
- Pattern by Luke Emery, 1998

Y2K

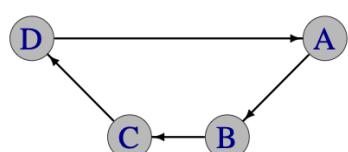


Juggler

Beat	A	B	C	D
1			B	B
1.5	C,D	A		

- 12 clubs
- One of the most difficult non-extra-club patterns that we've done (doable if Peter Kaseman is **B**)
- 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 180° 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 ½ beat off).
- Switch positions so that everyone can experience the challenge!
- Pattern by Prof Mike, December 31, 1999

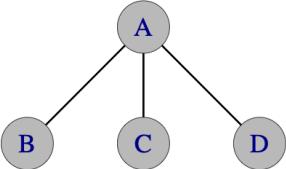
Canoe



	Beat
Juggler	1
A	B
B	C
C	D
D	A

- 12 clubs
- **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 backdrops
- We don't know who invented this pattern, but we have been doing it since 1993.
- You can add extra clubs or people and use a variety of passing counts.

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	
<ul style="list-style-type: none">• 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, <i>ultimate feed</i>; 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.

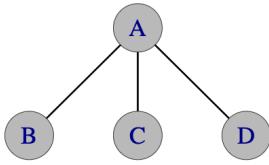
- All passes in singles. (Timing is a bit wonky. Throw a little outside, especially on the middle throws.)

- 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.

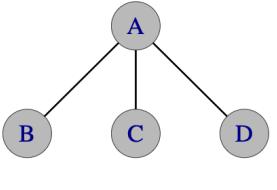
Popcorn Feed



	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

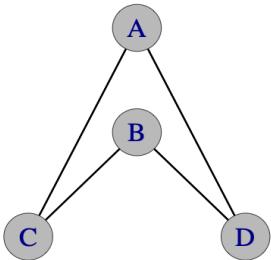
- 14 clubs (i.e., 2 extra)
- Recall that a (6-count) popcorn pattern between 2 jugglers is a 7 club pattern where the jugglers are passing a beat out of sync. With the right hand, each juggler passes a double spin to partner, a single spin to self, and a triple spin to self. Think 3-2-1 out of the right; 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 selves, 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	
	A	
	B	See description
	C	
	D	
<ul style="list-style-type: none"> • This is one variation on the 3-person <i>Gorilla</i>. • 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. 		

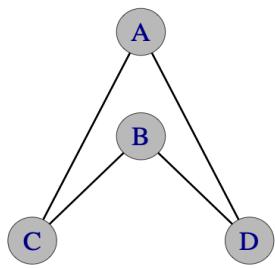
Extra club Y's (Slingshots) *[NEEDS CHECKING BY LUKE OR PETER!]*

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

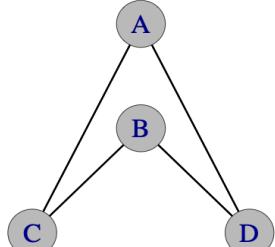
Slingshot Minus



	Beat (2-count base)			
Juggler	1	2	3	4
A		t-C		t-D
B	C		D	
C	B		t-A	
D	t-A		B	

- 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

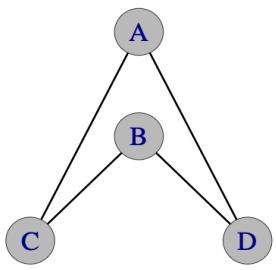
Slingshot Plus



	Beat (1-count base)			
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	

- 14 club variation of *Slingshot Minus*; should be easier!
- Both hands counting; all jugglers in 2-count
- Usually right-hand counting (could be left!)
- **B** starts left handed, and then proceeds in 2-count doubles rights to **C** and **D**

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

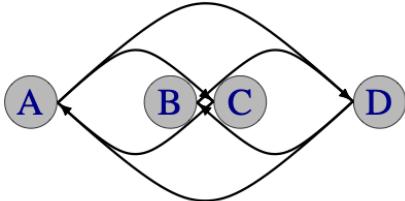
- 16 clubs
- All right hands are triple passes
- Variation of the Y (i.e. the *Ooogle*)!!
- Usually right-hand counting (could be left!)
- All jugglers are synced up, with **A** and **B** facing **C** and **D**
- All juggler start with 4 clubs and do 2-count rights
- **A** does a triple feed to **C**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

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.

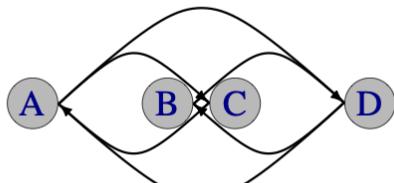
Locked Lines



	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

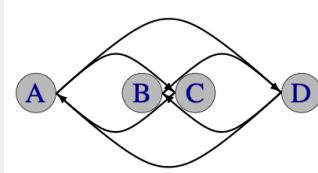
OK, this is a non-trivial stationary pattern!

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!]

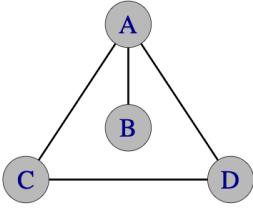
	A	d-C				t-D	
	B		t-C		d-A		
	C		t-B		d-D		
	D	d-B				t-A	

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= $\frac{1}{3}$ (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
	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

*****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!

Juggler/beat	1	2	3	4	5	6	7	8	9	10	11	12
Al	*	Cr		s		Dr	s		Dr		Cr	
Ar		s		Dl		Cl	*	Cl		s		Dl
Bl			Dr	s		Dr		Cr		*	Cr	s
Br				*	Cl		s		Dl	s		Dl
Cl					Al	Bl	*	Bl		s		Al s
Cr			Br		s	Ar	s		Ar		Br	*
Dl					Bl	*	Bl		s	Al	s	Al
Dr						Ar	s		Br		*	Br

- Legend: Al = left hand of A
- Cr = right hand of C
- * = handoff
- s = self pass

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*****

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

Juggler	Beat (2-count base)							
	1	2	3	4	5	6	7	8
	A	B	C	D	C		C	
	B	A	move		C	move		
	C		A		A	B	A	D
	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

A	1	2	3	4	5	6	
	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
		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= $\frac{1}{4}$ (on 2-count); spinniness=0; motion=1 JU, assuming pairs start $\frac{1}{2}$ JU apart (maybe they are a bit more distant!)
- Pattern by Prof Mike and MAJ, 1997

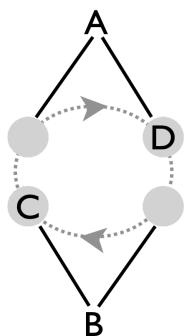
Unicycle

Juggler	Beat (3-count base)							
	1		2		3		4	
A	C		C		D		D	
B	A		A		A		A	
C	B	→	B	↓		←		↑
D		←		↑	B	→	B	↓

starting configuration

- 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= $\frac{1}{4}$ (on average); spinnyness=0; motion=perimeter of circle for movers, say $\pi / \sqrt{2} \approx 2.2$ JU, **C** and **D** are $1/\sqrt{2}$ 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.
- $PBJ = \frac{1}{3}$ (3-count base); spinyness = 2π 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.

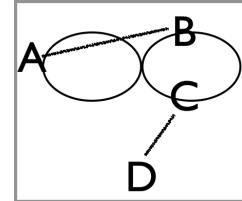
Chocolate Stir

Juggler	Beat (both hands counting)							
	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 $\frac{1}{2}$ pirouette's we get chocolate stir
- Difficulty: PBJ = $\frac{1}{2}$; spinnyness= 2π per cycle.
- Pattern by Luke Emery

$2\pi/3$ with Post

Recall the 3-person $2\pi/3$ 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.

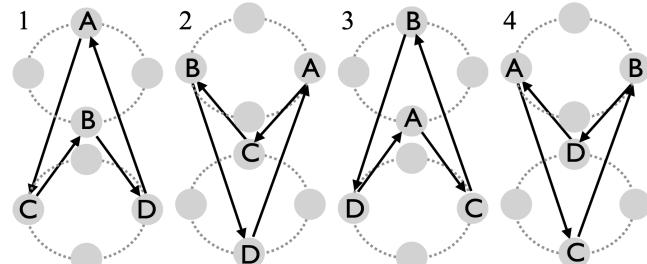


Difficulty: all jugglers on same count, e.g. 5-count comfortable PBJ= $\frac{1}{6}$.

Feeder **D** is stationary; others move (6 positions) with spinnyness 2π 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 = $\frac{3}{8}$ (standard version); spinniness=0; distance = 2 JU if you think of moving on the diamond of side length $\frac{1}{2}$ JU, or $\pi/\sqrt{2} \approx 2.2$ JU if you think of moving in a circle (this has C-D start $1/\sqrt{2}$ 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:		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
	7		C	A	B
3	8		C	A	B
	9		C	A	B
	10	D	C	A	
4	11	D	C	A	
	12	D	C	A	

After step (4), notice **B** moves, and we're back to the configuration of (1), but rotated 2 clicks (each $2\pi/5$) 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]

Here's where the fun really begins!

Weave				
	Juggler			
	A	B	C	D
Base Beat	Start position			
		1	9	5
1	B ₁	A		
2	C ₁₀		A	
3	D ₇			A
4	B ₄	A		
5	C ₁		A	
6	D ₁₀			A
7	B ₇	A		
8	C ₄		A	
9	D ₁			A
10	B ₁₀	A		
11	C ₇		A	
12	D ₄			A

Position detail:

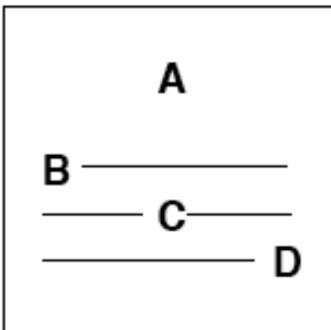
The diagram illustrates the 12 positions of the Weave pattern. Positions 1 through 10 are arranged in a circle, with 4/10 at the center. Positions 11 and 12 are at the bottom. Arrows indicate the sequence of moves between positions. The sequence starts at position 1, moves clockwise through 2, 3, 4/10, 5, 6, 7, 8, 9, 10, 11, and 12, then loops back to 1.

- 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 **basically** impossible for 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 = $\frac{1}{6}$ per weaver, $\frac{1}{2}$ for the feeder; mean= $\frac{1}{4}$. No rotation (spinniness=0). Thinking of the shape as a lemniscate, motion=perimeter= $\sqrt{2}\pi \approx 3.7$ JU , assuming feedees start each $1/\sqrt{2}$ JU apart (i.e. a bit wider than for a stationary feed; width of weaver line = $\sqrt{2}$ JU; remember JU = juggling unit = distance separating typical passers!). Partners=1 for feedees and 3 for feeder, mean=3/2. ****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

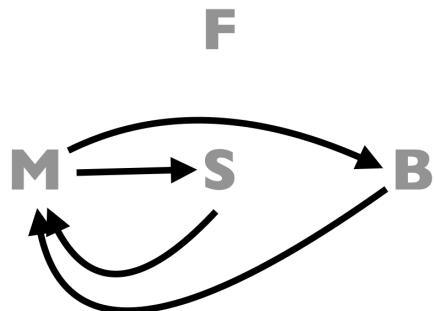
Dresser Drawer Weave



Juggler	1	2	3
A	B	C	D
B		A	
C			A
D			A

- 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: ******

Inside Out Weave



F feeder
B big loop
S small loop
M middle

- 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.

EI Turmeric Weave

POSITION TABLE				
	JUGGLER			
	α	β	γ	δ
1	F	M	S	B
2	F	M		
3	F			B
4	F		M	
5		S		F
6	M			F
7			B	F
8		M		F
9	S		F	
10			F	M
11		B	F	
12	M		F	
13		F		S
14		F	M	
15	B	F		
16		F		M
17=1	F		S	

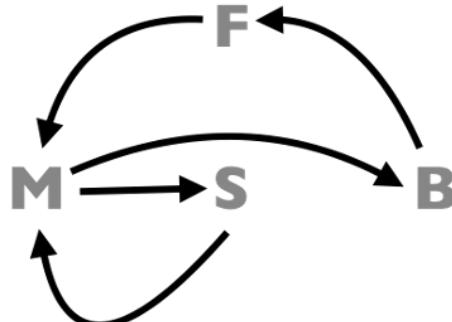
Passes go between two the jugglers whose positions are highlighted.

Starting positions

This fun moving pattern comes from the *inside-out weave*, and it amounts to constantly changing the feeder, replacing them with the juggler from the big loop. The 2-count base is pretty fast but fun for the pros; the 3-count base gives a nice comfortable and balanced pattern.

As you move through the feeder position, you pass 4 feeder throws (say on 3-count), the first and fourth are always the same juggler, who starts in the small loop and ends up in the middle. (Feeder passes to small, middle, big, middle.) You move into or out of the feeder position on 6 count, and you move through the weave positions with three 9 count throws.

Feeder (**F**) passes to the weavers, who move through small-loop (**S**), middle (**M**), and big loop (**B**).



One nice thing about *EI Turmeric* is that everyone moves and does the same moving and passing sequence (out of phase), so the instructions are a bit easier to deliver; though the cycle is a bit long for some! Like the other “EL” patterns (*EI Nino*, *EI Turbo*), *EI Turmeric*’s feed position passes 4 times, with first and last to the same juggler.

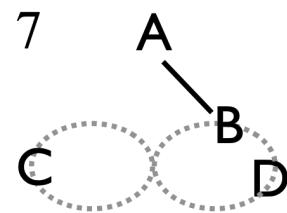
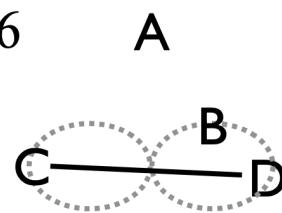
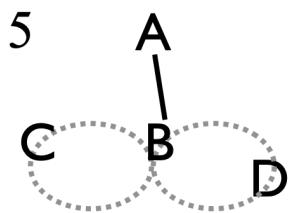
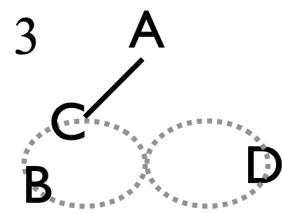
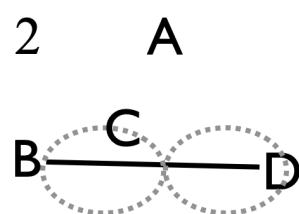
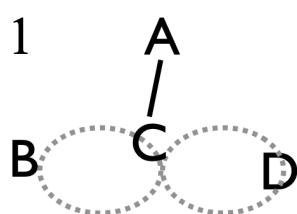
Metrics: 12 clubs, 4 moving jugglers, 16-count cycle. **PBJ = **.** Full 360 degree (2π rads) rotation and 4 spot changes per cycle. Motion = **** JU.** Partners=3.

	Mike, Mel, Jeff, and Nathan created this on September 8, 2022.
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That's a Good One

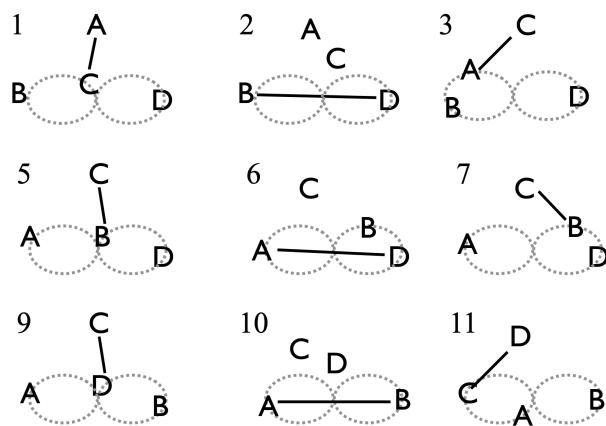
	Beat (1-count base; i.e., both hands counting; 24 beat full cycle)											
Juggler	1	2	3	4	5	6	7	8	9	10	11	12
A	C		C		B		B		D		D	
B		D			A		A			C		
C	A		A			D				B		
D		B				C			A		A	

- 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 π per weaver per cycle. Distance travelled as in *standard weave* ($\sqrt{2}\omega \approx 3.7$ 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.

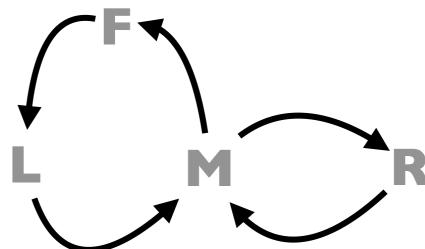


In each cycle each juggler does

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.

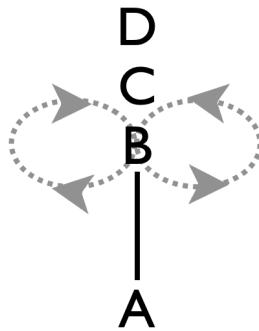
You find in running this that the maneuver into and out of the feed entails a series of 6 2-count passes in a row while moving in a tight circle (see left). It's pretty fun!

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.

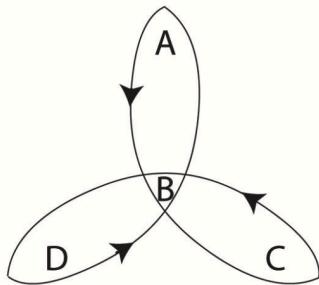
Metrics: 1 feeder on 2-count; 3 weavers at 12-on-2-count; passing from one position but motion through figure 8; 0 spinnyness. [on 2-count-base PBJ= $\frac{1}{6}$ for 3 weavers and $\frac{1}{2}$ for feeder; mean PBJ= $\frac{1}{4}$].] **JU**

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.

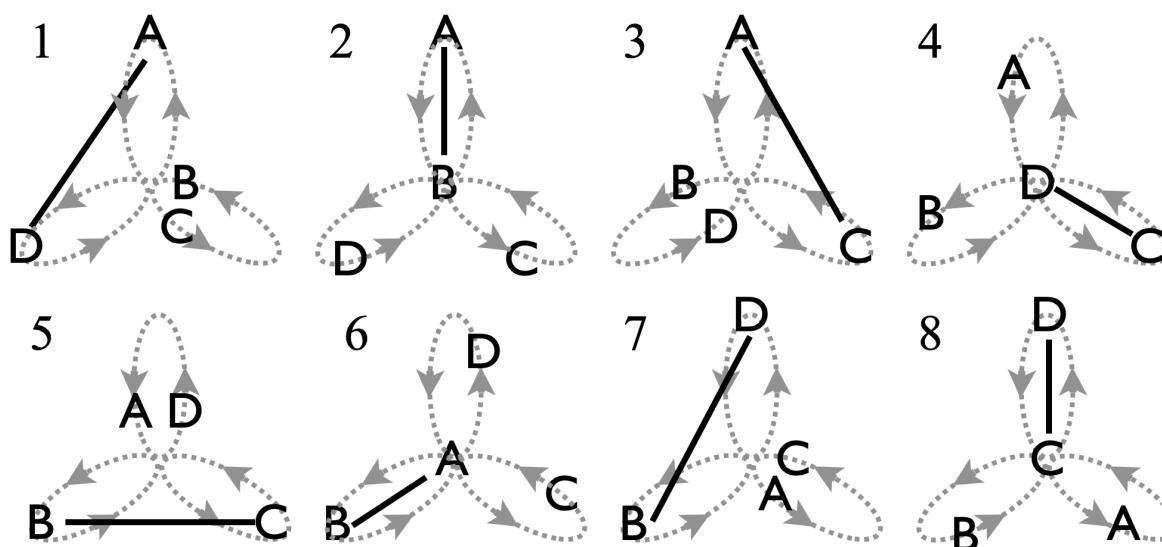
Three Leaf Clovers

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)									
		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

- 12 clubs; 4 jugglers; 24 beat full cycle; 8 beat local cycle; typically right-hand start
- **Rule:** sweep feed right 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=bJLnODIIHMI>
- **Metrics:** 4 passes/8 base beats per juggler (2-count standard is $\frac{1}{4}$ PBJ); the 3-count base *run-over-clover* has $PBJ=\frac{1}{4}$ also! Spinnyness 2π to complete the three leaves; $2\pi/3$ 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 $1/\sqrt{2}$ JU is about right, which makes the distance per cycle = $\pi\sqrt{2} \approx 4.4$ 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!

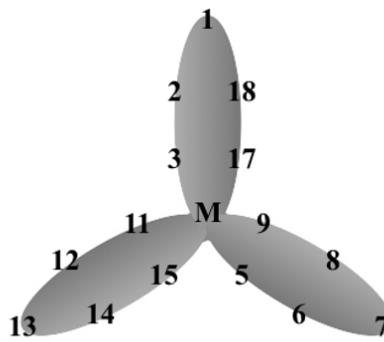


Local cycle: **A** starts the feed and ends one leaf to the left ready to start a second feed.

Standard Three Leaf Clover: Detailed View

	JUGGLER			
Beat, Base count	A	B	C	D
1	1	9	5	13
2	1	M	6	14
3	1	11	7	15
4	2	12	7	M
5	3	13	7	17
6	M	13	8	18
7	5	13	9	1
8	6	14	M	1
9	7	15	11	1
10	7	M	12	2
11	7	17	13	3
12	8	18	13	M
13	9	1	13	5
14	M	1	14	6
15	11	1	15	7
16	12	2	M	7
17	13	3	17	7
18	13	M	18	8
19	13	5	1	9
20	14	6	1	M
21	15	7	1	11
22	M	7	2	12
23	17	7	3	13
24	18	8	M	13
25-1	1	9	5	13

Starting positions



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)

	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

starting configuration

- 12 clubs; 4 jugglers; 24 beat full cycle; 8 beat local cycle; typically right-hand start
- **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=½ on 5-count, but the spinning makes it super hard; spinniness may be $\pi + 2\pi/3$ per local cycle! Distance travelled the same as the standard clover = $\pi\sqrt{2} \approx 4.4$ JU.
- [link the ZIZO video]
- [See the piano role] **On Mark laughing as we try get it to work!** Dizziness metric!

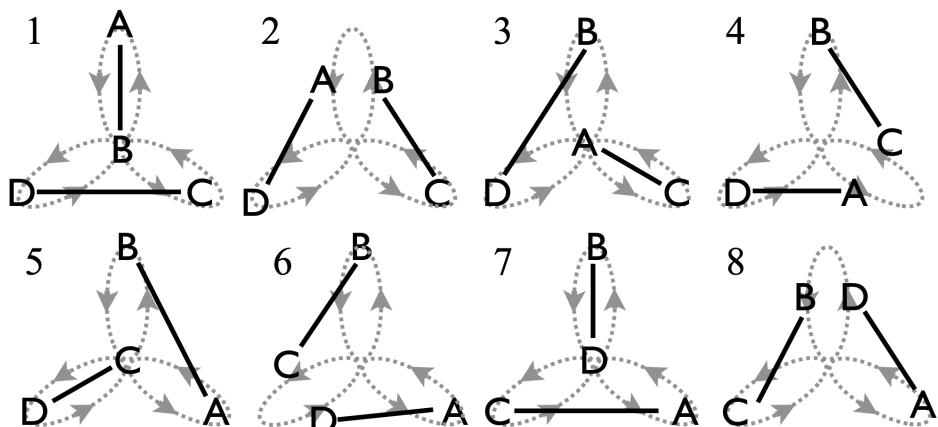
More Obscure Clovers

Mike's Original Clover

	Beat (4-count base)			
	Juggler	1	2	3
A	B	D	C	D
B	A	C	D	C
C	D	B	A	B
D	C	A	B	A

starting configuration

- 12 clubs; 4 jugglers; 4 beat local passing cycle; 8 beats to complete $\frac{1}{3}$ 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 3π per cycle). PBJ= $\frac{1}{4}$; same distance as standard clover.
- Performed by Mad-5 at 1998 Madfest (4-count base version).



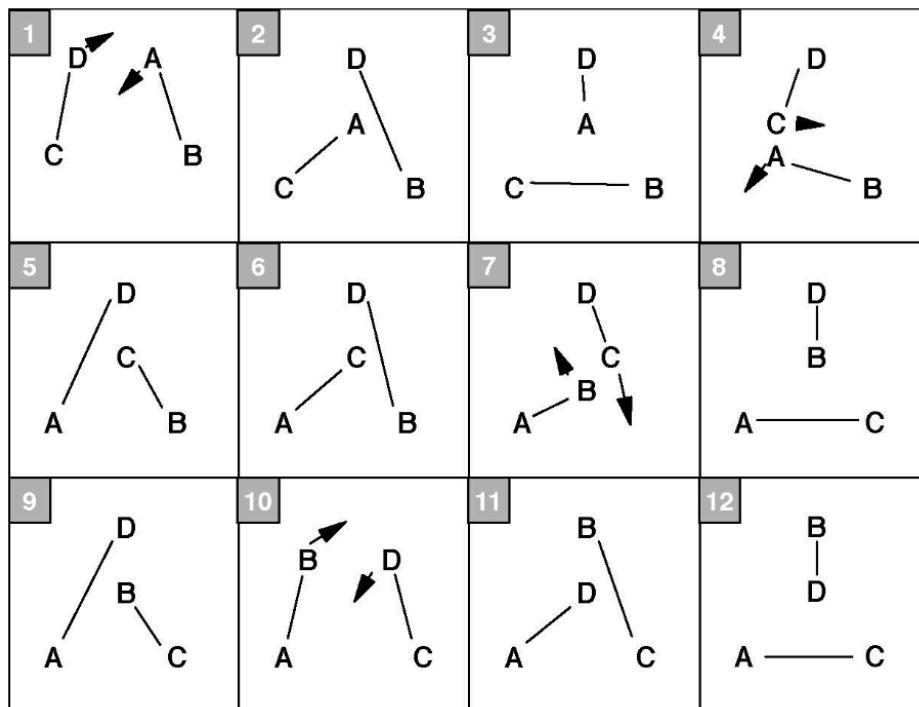
2 local cycles: **B** pushes **A** out of top leaf, **A** moves on to push **C**, who pushes **D**, and so on.

Peter's Clover

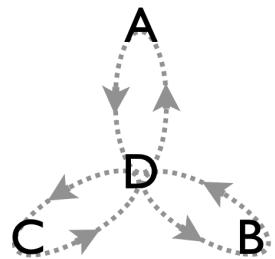
starting configuration		Beat (4-count base)					
	Juggler	1	2	3	4	5	6
	A	B	C	D	B	D	C
	B	A	D	C	A	C	D
	C	D	A	B	D	B	A
	D	C	B	A	C	A	B

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 $\frac{1}{3}$ of a full rotation where relative positions reset; 36 beat full cycle; Typically a right-hand start and 4-count base. PBJ= $\frac{1}{4}$.
- **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.



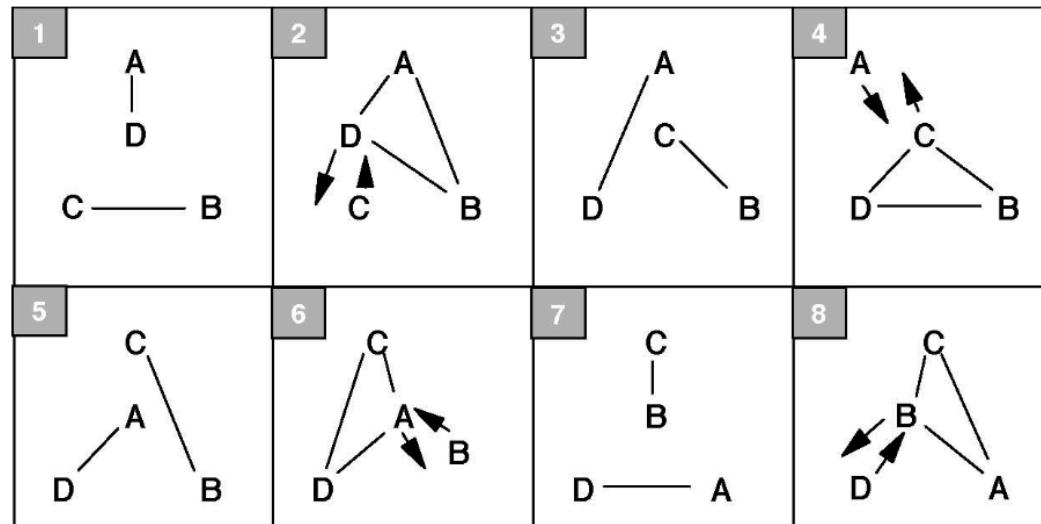
Steve's Clovers



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	

- 12 clubs; 4 jugglers; ? beat local passing cycle; ? beats to complete $\frac{1}{3}$ of a full rotation where relative positions reset; ? beat full cycle;
- The passing rate and movement along the leaves is the same as in Mike's original clover. In Steve's version, for the odd numbered passes, **A** and **D** always pass to each other, and **B** and **C** always pass to each other. For the even numbered passes, three jugglers pass to each other in a triangle. The juggler not in the triangle will be 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.)



- Idea: Run the three-person laxative in place of each insides triangle!

El Patterns

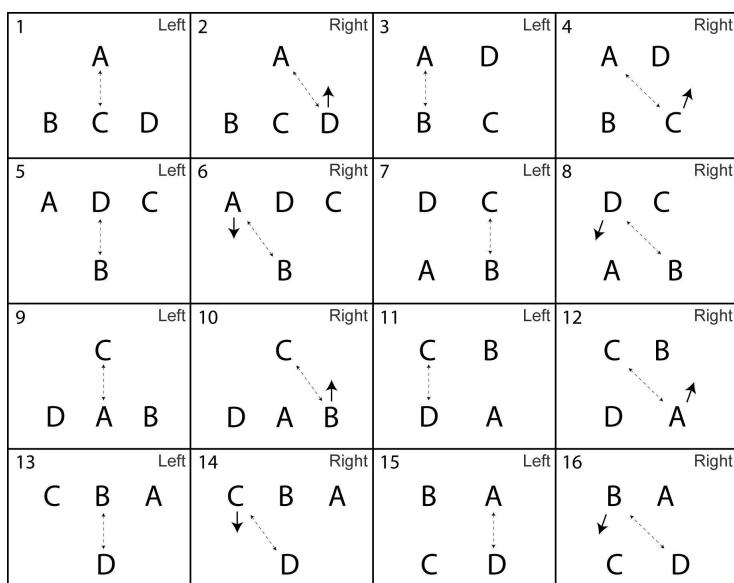
We saw *El Turmeric Weave* in the weave section earlier in the book. That's one of a series of 4-person advanced moving patterns. The first and coolest in that series is *El Niño*, which was created during the famous 1997 meteorological event by the same name!

[https://en.wikipedia.org/wiki/1997_El_Ni%C3%B1o_event.](https://en.wikipedia.org/wiki/1997_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

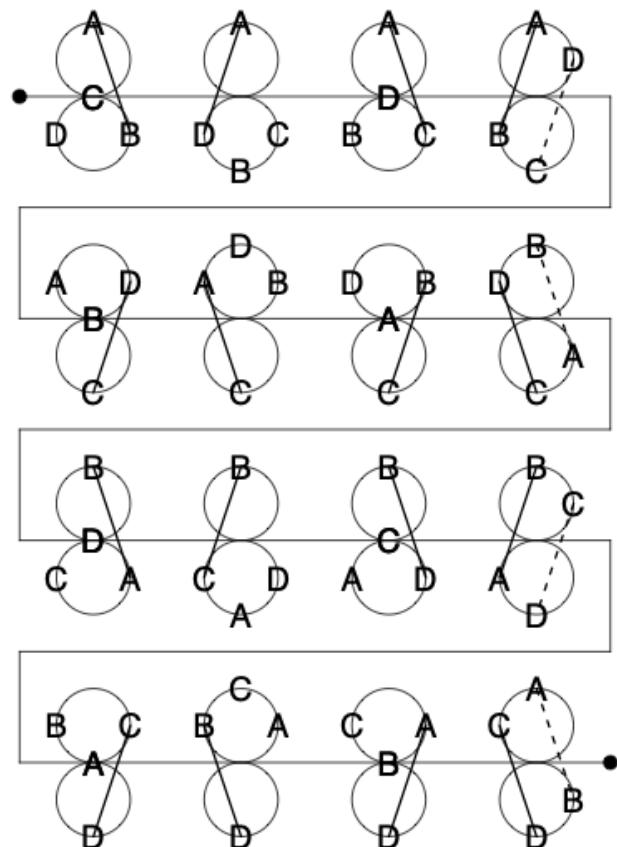
El Niño is a rotating 1 count feed and is one of the crown jewels of the MAJ. It is a challenging pattern, but quite doable once passers master the stationary *1-count feed* and the *2 on 2 double 3-count box*. It is essentially a continuous switch-sides 1-count feed. And once you master it, you can 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 Niño 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 Niña! :)
- ****video/MAJ show; game to play with 5****
- **Metrics:** PBJ=½; spinnyness 2π ; 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 = $\frac{1}{4}$ on 2-count, $\frac{1}{6}$ on 3-count

With extra passes 10/32 (2-count), 10/48 (3-count)

Spinnyness= 2π ; motion through 8 positions

Partners=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 spinniness, motion, and partners as *El Turbo*, but cycle length is 48 on 1-count base. Ignoring extra passes, PBJ= $\frac{1}{2}$.

Extra-Club Moving 4-Person

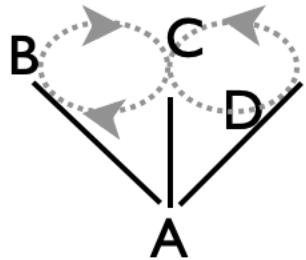
Extra Club Switch Sides Feed <i>Windshield Wiper Version</i>														
Beat (1-count base; i.e. both-hands counting)														
Juggler	1	2	3	4	5	6	7	8	9	10	11	12	13	14
A	d-B		d-C		d-D		d-C			d-C				
B		d-A		d-s	$\frac{1}{2} P$				d-C		d-s	$\frac{1}{2} P$		
C				d-A				d-B		d-A		d-D		d-A
D	d-s	$\frac{1}{2} P$				d-A		d-s	$\frac{1}{2} P$				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 vice versa.
- Movers **B** and **D**, who go back and forth on 6 count ($\frac{1}{2} P$ 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), spinnyness π , with 2 partners, and distance 2 JU to get back and forth. Overall PBJ=7/28= $\frac{1}{4}$.
- Pattern by Luke Emery.

Extra Club Weaves

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



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

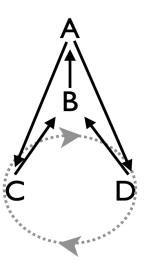
Feeder **A** starts with 4 clubs and passes 3-count straight doubles, windshield-wiper style, deep on the ends and loopy in the middle. The three weavers are in sync with **A**, and respond in 9-count crossing doubles back to **A**. Works especially well with Nick Aickens as the feeder! It's slower than 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 feeders 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...

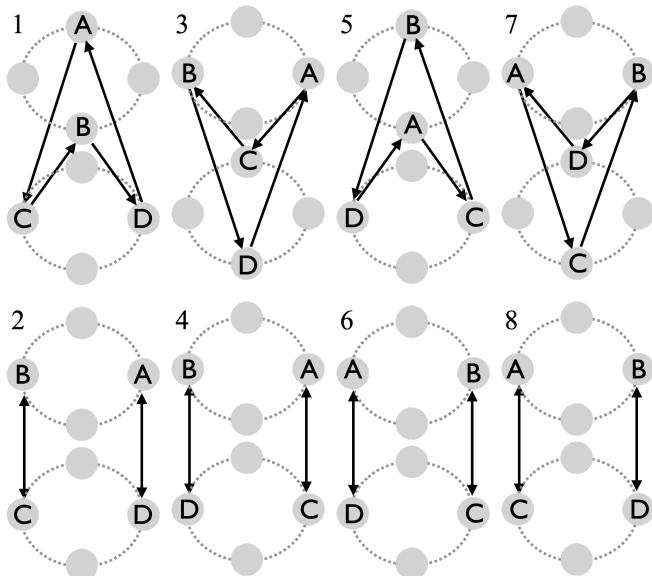
Here's a very fun and much more doable extra club moving pattern.

Unicycle Plus																starting configuration and passing lanes			
	Beat (1-count base)																		
Juggler	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						

- 13 clubs (1 extra); 4 jugglers; 16 beat cycle
- **B** faces the wheel and is doing 4-count back-drops to **A** (the seat); they are both stationary
- **A** passes 4-count triples to both sides of the wheel.
- **C** and **D** form the wheel, with 2 passes to the post (on 4-count rights) followed by two phantoms while on the bottom of the wheel; moving steadily for a smooth ride!
- **C** starts with 4; others with 3 clubs; **B** starts with left self; **A** and **D** start with right selves.
- **Metrics:** Passes doubles, triples, and dropbacks; **C** and **D** move but don't spin; PBJ= $\frac{1}{4}$ for **A** and **B** and $\frac{1}{8}$ for **C** and **D**. Overall PBJ=3/16! Distance travelled by movers is circumference of the circle, whose diameter is perhaps $1/\sqrt{2}$ of a JU, so about 2.2 JU. (About 2 JU per loop)

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.

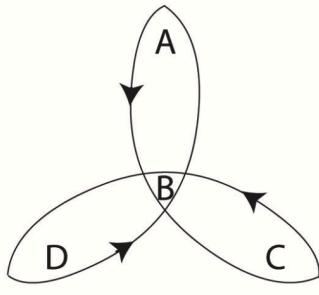
All passes are double spin passes. Four passes are needed to transfer the extra clubs to the team that is not moving.

It's probably helpful to be comfortable with 7 club popcorn variations before learning this pattern!

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.

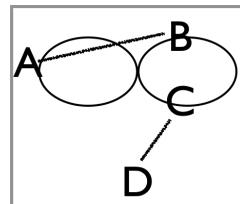
Here's an extra club version of the standard clover but without the doubling up...a super challenging pattern to get the leads just right!

	Juggler			
	A	B	C	D
Hyper Clover				
12 beats, 1-count base (i.e., both-hands counting) 13 clubs (i.e., 1 extra)	1		-	A
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.	2	B	s	
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.	3	A	-	s
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!	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...**			

2π/3 with post + 1

Recall the $2\pi/3$ 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!

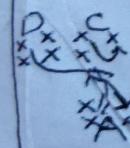
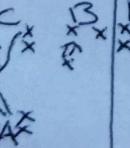
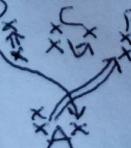
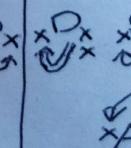


Metrics: **

El Nino Plus (slow)

	1	2	3	4	5	6
A	Single L	Single R	Single L	Single R	Self L	Double R
B	Self L	double R	Self L	Self R	Self L	Self R
C	double L	Self R	Self L	Triple R	Self L	Self R
D	Self L	Self R	double L	Self R	Self L	Self R
Diagram						

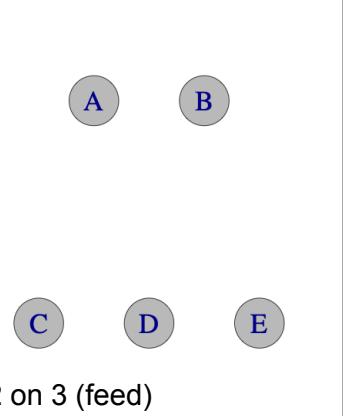
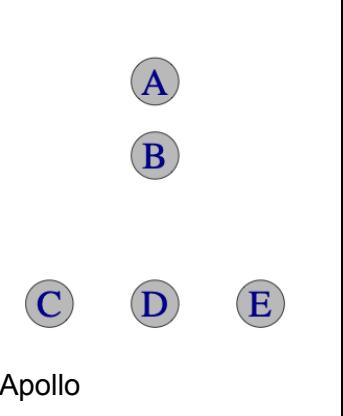
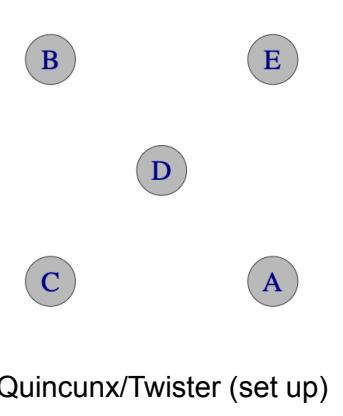
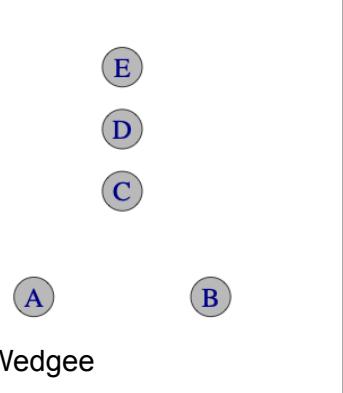
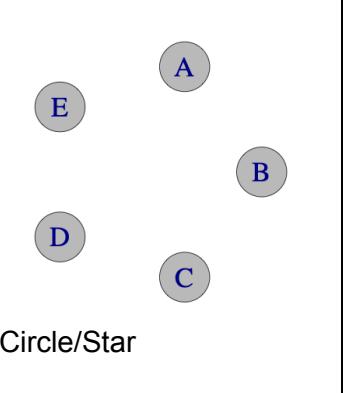
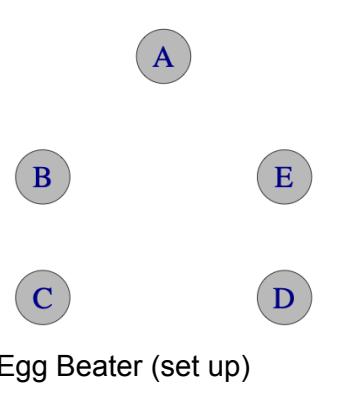
El Nino Plus (fast)

	1	2	3	4	5
A	Double L C	Double R D	Double L B	Double R C	Self L A
D	single R A	Self L D	Single R A	Crossing double Self L D	Pause — —
C	Self R C	Single L A	Self R C	Self L C	Double R A
B	double self fixing L B	Pause —	Self R B	Single L A	Self R B
					

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**.

 <p>2 on 3 (feed)</p>	 <p>Apollo</p>	 <p>Quincunx/Twister (set up)</p>
 <p>Wedgee</p>	 <p>Circle/Star</p>	 <p>Egg Beater (set up)</p>

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!

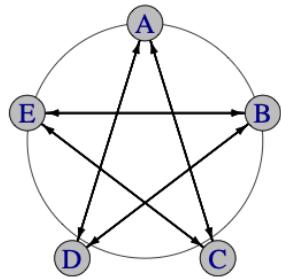
Cockeyed Apollo		1	2	3	4
Same layout, but different <i>who-passes-to-whom.</i>	A	E		C	
	B	C	D	E	D
	C	A		B	
	D		B		B
	E	B		A	

- 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=[1(2/4) + 1(4/4) + 3(2/4)]/[(2)(5)] = 3/10 = 0.3 (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
<ul style="list-style-type: none"> • 15 clubs • Any beat of choice, all throws simultaneous • Right throws go to person two 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!

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	

- 15 clubs; any beat of choice
- Pass sequentially around the circle, including yourself in the count.
- 3 and 4 count are pleasant; 2-count requires some good passers and good timing. (1-count is a dream!)
- Cycle length=5 on base count; $PBJ=[4/5]/[base]$, e.g., 0.27 on 3-count; 0.2 on a 4-count, $OJ=4$.

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:

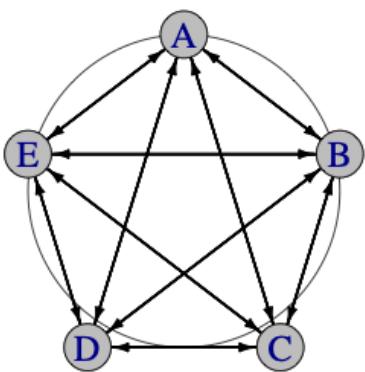
Picnic

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 $PBJ = [5(4) + 5(5)]/[5(40)] = 0.225$. 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)			
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	

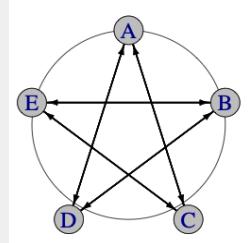
This variation is somewhere in between a *feast* and a *star*. You do not pass to the same person you receive from, and the passes to neighbors are at a pretty sharp angle, making this pattern difficult even on the 3-count. It's possible but even harder on 2-count or 1-count. Passes move around the circle like in a *feast*, though unlike a *feast* you do not count yourself (hence *selfless*!).

We have been doing this pattern since at least 1992, and are unsure of its origins.
PBJ=1/3, OJ=4.

Stationary Isla Vista [non-weaves!]

In these circle patterns, a 2-count feed travels around the circle. No juggler passes to either of their adjacent neighbors; all jugglers follow the same pass-gap sequence (**version**), but out of sync.

Origin: 2666 not MAJ???**NEEDS CHECKING AGAINST FIGURE**



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.

But for those seeking a more challenging pattern, here's a

2454 variation

```
| **Juggler/beat** | **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 |
```

> * Both hands counting

> * Pattern mirrors itself, so full pattern is 30 throws.

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	<p>Standard formation</p>	<p>Wedgee formation!</p>
Chocolate bar 3-count feed: aka Chocolate Box 2 feeders share a 1-count feed		

Juggler	Base beat (1-count)												
	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
- $PBJ=[3(1/3) + 2(2/4)]/5 = 2/5 = 0.4$; $OJ=(3x2+2*3)/5=2.4$.

Double chocolate double 3-count feed

	1	2	3	4	5	6	(1-count base)
A	C	C	D	C	C	D	<ul style="list-style-type: none"> • 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 • $PBJ=[2(1/1) + 3(2/3)]/5 = 4/5 = 0.9$ • $OJ=2$
B	E	D	E	E	D	D	
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		<ul style="list-style-type: none"> • 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. • $PBJ=$ $[2(2/3) + 2(3/6) + 1(1/3)]/5 = 0.53$ • $OJ=2$
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	
B		D		C		E
C	A			B		
D		B			A	
E			A			B

- Feeders in 2-count (one left and one right)
- Feedees in 3-count
- Pattern by Steve Otteson and MAJ
- PBJ=[2(1/2) + 3(1/3)]/5 = 0.4
- OJ=2

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.

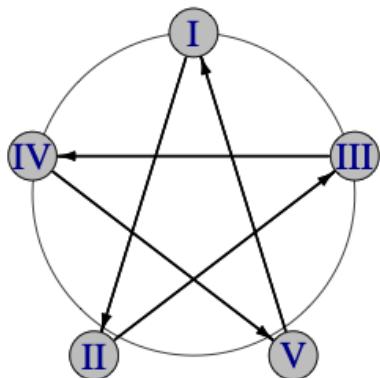
This is a great pattern for 5 jugglers who are comfortable passing doubles from either hand.

$J = 5$ jugglers; cycle length=10 beats; $PBJ = 1/5 = 0.2$. $CJ = 16/5 = 3.2$, 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); $\frac{1}{2}$ 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: $J = 5$ jugglers; cycle length=10 beats; $PBJ = 2/5 = 0.2$. $CJ = 17/5 = 3.4$, OJ=2.

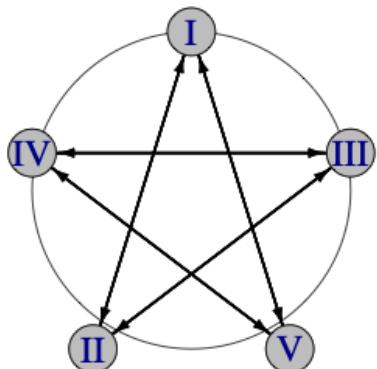
Origin: ? (Luke?)

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); $\frac{1}{2}$ 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

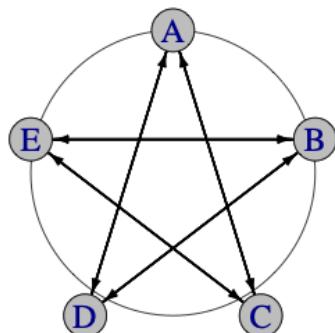
Notice how many selves are happening in the *5-count extra-club star*. This variation soaks some of those selves with zippy single-spin (straight) throws to an appropriate partner. Each single-pass event happens almost orthogonal to the same-time double, which minimizes collision potential. It leads 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!)

$J = 5$ jugglers; cycle length=10 beats; $PBJ = 3/5 = 0.6$. $CJ = 16/5 = 3.2$, 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 straight forward 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



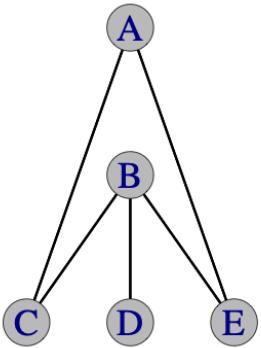
Beat, 1-count base (i.e., both hands counting)

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.

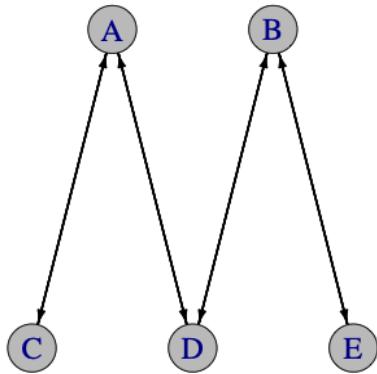
Apollo Plus Plus

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= $[3 \times 2 + 2 \times 1] / 5 = 8/5 = 1.6$, 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.

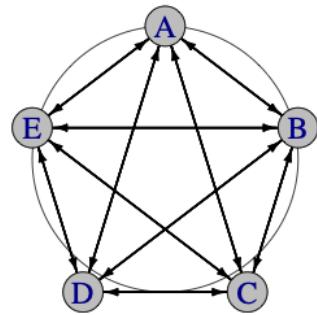
Metrics: J=5, CJ=3.2 (1 extra), THJ=2, PBJ=[3x2+2x1]x2/6=1.67, counting each passing beat as 2 considering clubs are passed in pairs!

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.

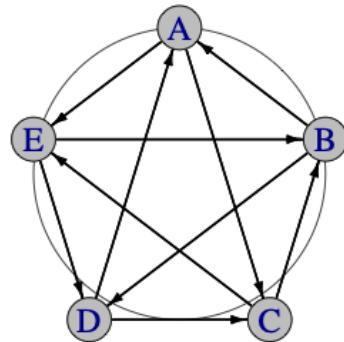
Metrics: J=5, CJ=3.2, PBJ=1/5; cycle length=25 on 1-count base. OJ=4

[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

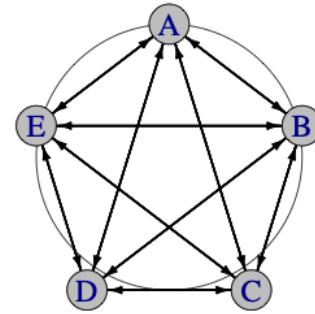
	Beat (1-count base)				
Juggler	1	2	3	4	5
A	pause		d-E		t-C
B		t-D	pause		d-A
C		d-B		t-E	pause
D	t-A	pause		d-C	
E	d-D		t-B	pause	

Metrics: J=5, CJ=3.4, PBJ=%, 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	
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=%, OJ=4 (in-degree 2, out-degree 2) , THJ=2.

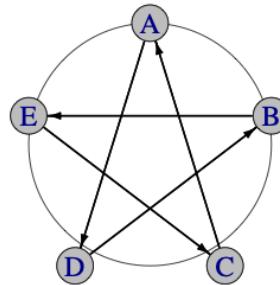


- Both hands counting
- All right hands are double passes or double selves; lefts are single selves.
- **A** and **E** start with 4 clubs and right hands
- **B,C** and **D** start with left hand

Interestingly, this is a stationary version of the *Mangled Squirrel*, which we arrived at by adding change sides to a *2 on 3 feed!*

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=?, 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

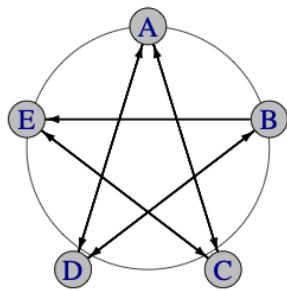
Triply Star, I																																					
<ul style="list-style-type: none"> • Right hand counting • A starts with 4 <p>If you want to get crazy, note that each juggler has 2 right selves in a row. That's exactly enough time for each juggler to do a triple self with a pirouette and stay in time.</p> <p>If you need to mellow it out, you can remove all the single passes and just pass a triple around in 10-count.</p>	Beat (2-count base) <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Juggler</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr> </thead> <tbody> <tr> <td>A</td><td>t-D</td><td></td><td></td><td>C</td><td>D</td></tr> <tr> <td>B</td><td>D</td><td>E</td><td>t-E</td><td></td><td></td></tr> <tr> <td>C</td><td></td><td></td><td>E</td><td>A</td><td>t-A</td></tr> <tr> <td>D</td><td>B</td><td>t-B</td><td></td><td></td><td>A</td></tr> <tr> <td>E</td><td></td><td>B</td><td>C</td><td>t-C</td><td></td></tr> </tbody> </table>	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	
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 <ul style="list-style-type: none"> • Right hand counting • C starts with 4 <p>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.</p>					
	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 just 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

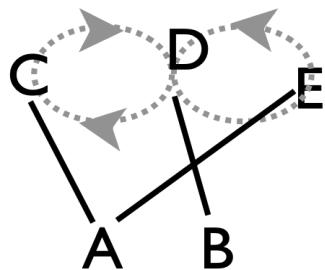
Metrics: J=5, PBJ=1/2, OJ=1, THJ=2, CJ=4. Cycle length 1 (on 2-count base). Origin unknown

Moving 5 Person Patterns

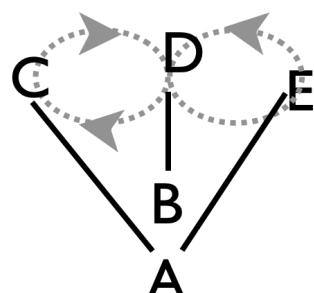
Weaves

Dr. Inside Dr. Outside Weave

Apollo Weave

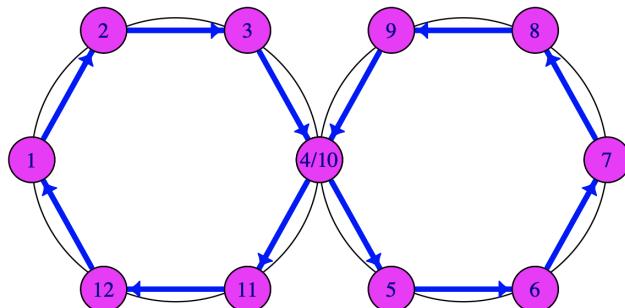


Standard Formation



Apollo Formation

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:



	A	B	C	D	E
Base beat			Start position		
	1	9	5		
1	C_1		A		
2		D_{10}		B	
3	E_7				A
4		C_4	B		
5	D_1			A	
6		E_{10}			B
7	C_7		A		
8		D_4		B	
9	E_1				A
10		C_{10}	B		
11	D_7			A	
12		E_4			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 basically impossible for 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.

Metrics: PBJ = $\frac{1}{6}$ per weaver, $\frac{1}{4}$ for each feeder; mean= $\frac{1}{6}$. No rotation (spinnyness=0). Thinking of the shape as a lemniscate, motion=perimeter= $\sqrt{2}\pi \approx 3.7$ JU , assuming feedees start each $1/\sqrt{2}$ JU apart (i.e. a bit wider than for a stationary feed; width of weaver line = $\sqrt{2}$ JU; remember JU = juggling unit = distance separating typical passers!). OJ=2 for feedees and 3 for each feeder, mean=2.

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.

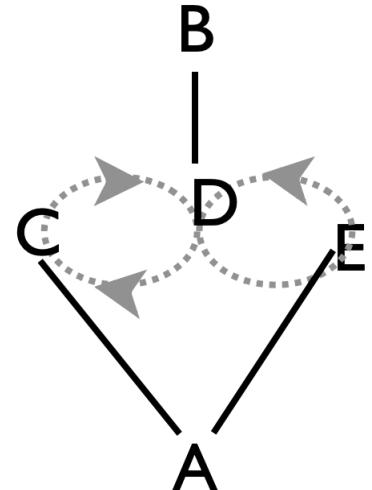
Twister Weave

The original *Twister Weave* is one of the great MAJ discoveries. It has the exact same passing table as above in the *Mr. Inside Mr. Outside Weave*. However, Mr. Inside (**B**) and Mr. 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!

Variations: All the timing variations as noted for *Mr. Inside Mr. Outside* also hold (e.g. a slow one is weavers on 9-count, feeders on 6-count; a faster one is feeders on 3-count and weavers alternative 4-count/5-count).

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.



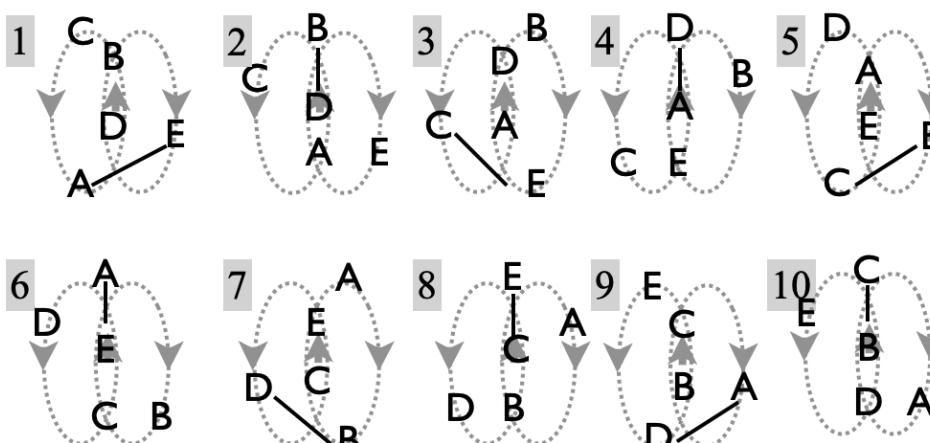
Animation
(<http://juggloid.com/editor/?s=sU0PC0>).

Watch SJRI
(<https://www.youtube.com/watch?v=hmP4aZVFGJc>)

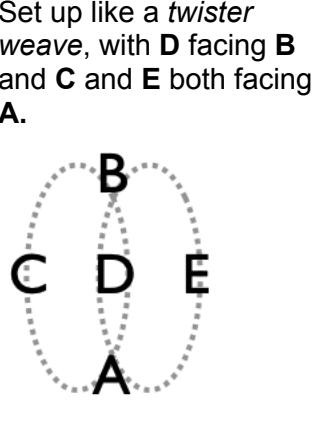
Pattern by Prof. Mike

Metrics: All the same as *Mr Inside Mr Outside Weave*, except with spinnyness 4π per weaver. Double time has PBJ=%.

Involated Twister										Tree Twister
	Base beat (3-count standard); ½ cycle									
	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



The *involated 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.)



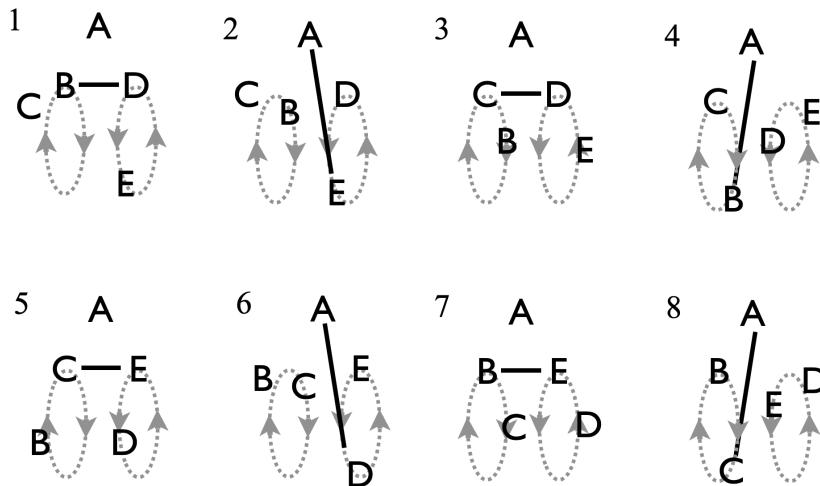
Set up like a *twister weave*, with **D** facing **B** and **C** and **E** both facing **A**.

Metrics: J=5, OJ=2 (involated), OJ=4 (tree), CJ=3, full cycle=20 (local passing cycle=5), PBJ=1/15 (3-cnt involated), 4/15 (3-cnt tree), 4/20=½ (4-cnt tree); **distance = **;** **spinniness= ****

Involated Twister by Prof Mike and Mel, August, 2022. The *Tree Twister* was born on 10/16/25, jugged on 4-count by Mike, Nathan, Mel, Mark and Carly at the church.

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		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	

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!

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	2	3	4	5	6	7	8								

Light grey are extra passes in a Martin Frost variation born at 1996 Madfest.

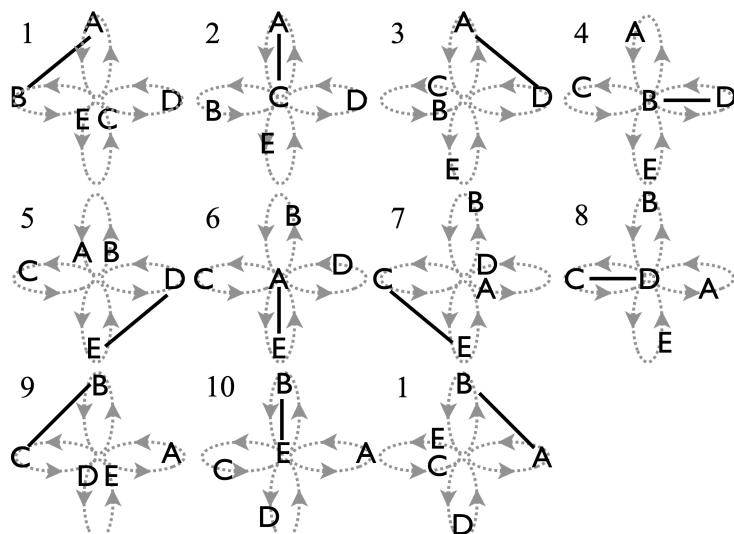
Metrics: J=5, cycle length=8, base count=2 (standard), OJ=((3)(4)+(4)(1))/5=5 %, CJ=3, distance=JU**, spinnyness=**; PBJ=((1)((1/4)+(4)(3/16))/5=½ (original); ((1)(1/3)+(4)(1/4))/5=4/15 (3-4-5); PBJ=((1)(1/3)+(4)(3/12))/5=4/15, cycle=12 on 1-count base. *Martin's:* PBJ=((1)(1/4)+4(5/16))/5=3/10.

Origins: 3-4-5 born about 2016.

Death Beater

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 $\frac{1}{4}$ 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)									
	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

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>)

Metrics: J=5, cycle length=10, base count=2 (standard), OJ=4, CJ=3, JU=**, spinnyness=**; PBJ=4/20=1/5, (standard, 2-count base); PBJ=3/10 (extra passes).

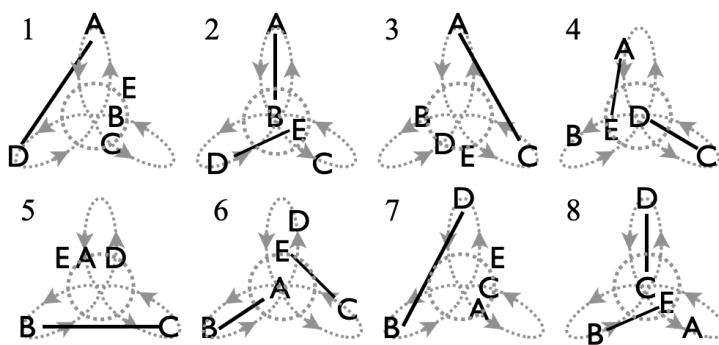
Three Leaf Clover with One Orbiter (the after-feed orbiter)



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 $\frac{1}{2}$ 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!]**

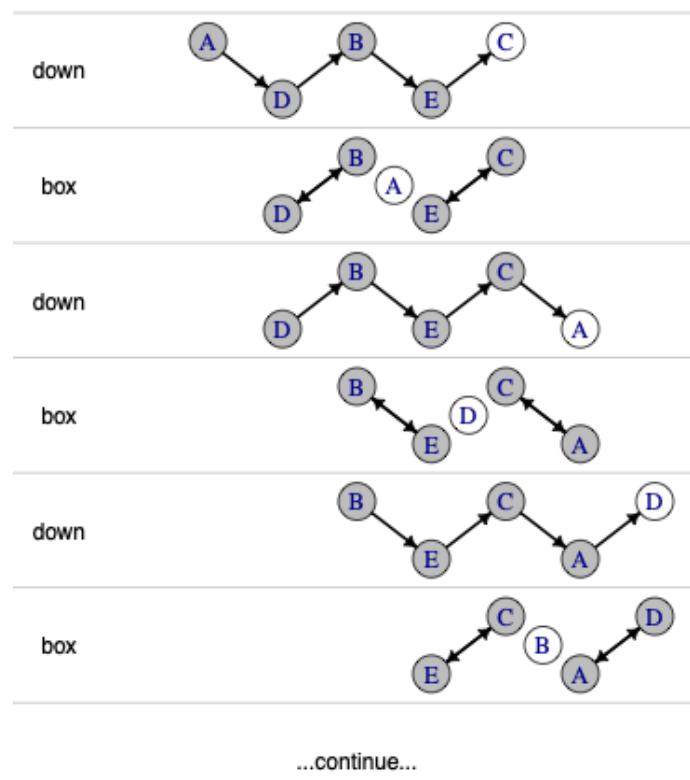


****talk about outside orbiter variation****

	Beat (base count; e.g. 2 count)							
	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

Metrics: J=5, cycle length=8, base count =2, OJ=4, CJ=3, **distance = ?**, **spinnyness= ?**, PBJ=(4x5+1x4)/(5x16)=0.3 on 2-count.

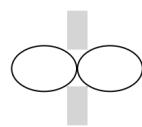
Gauntlet



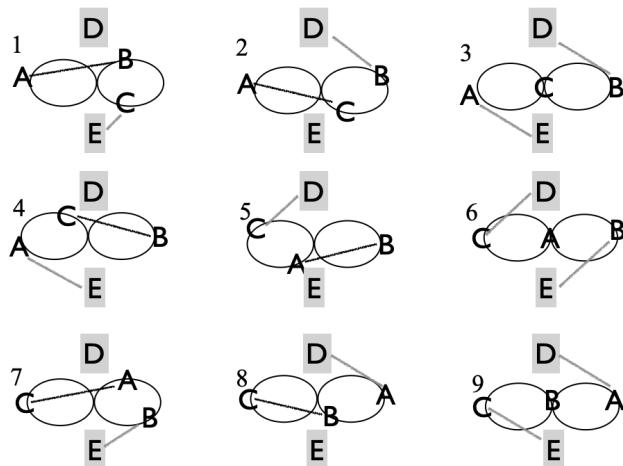
This is an easy but need-to-pay-attention moving pattern, which the **Cool Guyz** used once to exit the Madfest stage. It's a 5-person 4-count. On each passing beat, one juggler (clear circle in figure) has 2 clubs, and doesn't pass. (That's **C** at top of the pattern.) These blank beats occur twice 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,

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 $\frac{1}{2}$ cycle.

Metrics: Full cycle=18 beats ($\frac{1}{2}$ shown); PBJ is high! CJ=3, OJ=4, spinnyness=**, distance=**
Pattern by MAJ.

Quincunx

EI turbo with 1 post

EI turmeric

5-person laxative

Apollo Plus Weave

Here's a nice weave pattern (see later for more on weaves).

Start with the 1-1-3 Apollo 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.

Also see the 1-2-3 Apollo for 6 jugglers and the 1-2-4 Apollo for 7 jugglers.

Twirly Star

Here's a fun variation on the Shooting Star (4-person pattern), but with 5 people and less moving.

Juggler/beat	**1**	**2**	**3**	**4**	**5**	
-----	-----	-----	-----	-----	-----	
A	D	D	Pirouette	D	D	
B	E	E	E	E	Pirouette	
C	A	Pirouette	A	A	A	
D	B	B	B	Pirouette	B	
E	Pirouette	C	C	C	C	

> * Right-hand counting, 2-count

> * E starts with 2 clubs

Make sure to keep the count after the pirouette! (At first you can just pause for 2 counts instead of pirouetting.) You'll pirouette holding 2 clubs.

Pattern by Luke Emery.

PSPSP Twister Weave

Count: (Feeders share PSPSP, Feedees 5-count moving

Juggler/beat	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
----- ----- ----- ----- ----- ----- ----- ----- ----- ----- -----										
X	A			C			B			
Y		B			A			C		
A	X				Y					
B		Y					X			
C			X					Y		

> * Both hands counting

Fast Twister Weave

Count: Feeders 3 of 8, Feedees 4-count, moving

Juggler/beat	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
----- ----- ----- ----- ----- ----- ----- ----- ----- -----									
X	A		C		B				
Y	B				A		C		
A	X				Y				
B	Y				X				
C		X				Y			

> * Both hands counting

Ultra-Twister Weave

Count: Feeders 3 of 7, Feedees alternate 4-count, 3-count, moving

Juggler/beat	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
----- ----- ----- ----- ----- ----- ----- ----- -----								
X	A			B		C		
Y	B		C		A			
A	X				Y			
B	Y				X			
C		Y				X		

> * Both hands counting

Hyper-Twister Weave

Count: Feeders 2-count, Feedees 3-count, moving

This is a master-class pattern, owing to 180 degree turns after every pass and on 3-count. Good leads are essential!

Juggler/beat	**1**	**2**	**3**	**4**	**5**	**6**	
----- ----- ----- ----- ----- ----- -----							
X	A	C	B				
Y		B	A		C		
A	X		Y				
B		Y		X			
C		X			Y		

> * Both hands counting

There are lots of variations on the Twister Weave. See the Twister Plus, Double Time Twister, etc.

We can add 2 clubs to the standard Twister Weave and make the passes from X and Y to the weavers be triples (7 club 4-count between each side of the weave and the feeder), and the return passes triples too.

Another variation is to add 2 extra clubs and have the feeders do 4-count in fast popcorn (534p3).

Try the twister weave in chocolate bar too.

Original Twister Weave suggested by Mike Newton. Variations by MAJ.

Involuting Twister Weave

This variant has the feeders and feedees constantly swapping places with each other after they complete a pass. This results in everyone passing on an alternating 4-count, 6-count passing pattern. The jugglers' movements trace out the shape outlined below with arrows indicating direction of movements:

{width=50%}

The jugglers will need to pay attention though, as they alternate which semicircle they go around. In other words, each juggler traces out an elongated figure 8. Below follows a tabular recording of the passing pattern, along with an accompanying positional diagram.

Juggler/beat	**1**	**2**	**3**	**4**	**5**	
-----	-----	-----	-----	-----	-----	
X		B			A	
Y	C			B		
A			C		X	
B		X		Y		
C	Y		A			

> * Right hand counting only, all right hand passes.

{width=100%}

Notice that the pattern is only 5 beats long while it takes a total of 20 passing beats to return each juggler to their starting position.

Pattern created by Mike Newton and Melonhead August 2022.

Chocolate Swirl

The chocolate swirl is a moving extension of Double Chocolate Double Three Count. It is noteworthy for jugglers moving from one side of the pattern to the other with only a single self throw. That is possible. It is also noteworthy for being hard, both to remember and to juggle. The table shows a single transition where E moves to the other side.

-----	-----	-----
{width=22%}	{width=60%}	
positions	Both-hands counting	
	Right hand starts	

Once you get comfortable with one transition at a time, then you can run the transitions faster. Or so we imagine...we've never been that comfortable!

Pattern by Luke Emery

Egg Beater, Handle in the Batter

This variation moves the feeder to the other side of the pattern.

| {width=25%} | {width=45%} |
| positions | Right-hand counting |

{width=50%}

Pattern by Mike Newton and MAJ.

Egg Beater, Switching Handles (also, the Involtuted Egg Beater)

This pattern is a cool way to get the handle into the action, continuously. It was first done Nov 2, 17 (long after the original egg-beater) by Graham=A, Mel=B, Mike=C, Jeff=D, Nick=E; nickname EggBeatOff), and more recently done with lights on Library Mall, Aug 25, 2022!) The table shows positions where each juggler (column) must be at that passing beat [right-hand counting in rows]. Only passes are indicated. So positions 1-2 exchange, similarly 3-8, 4-7, and 5-6. The upper graph shows where each juggler moves; edge weights indicate number of right-hand counts up to next throw. Lower graph shows passing events. Start with jugglers at 4, 7, near 1, 2, and on the edge moving towards 6. 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.

Note: Mel likes to think of positions 3 and 4 as one spot, and likewise positions 7 and 8 as one spot, at which you make two passes. Mike likes to think of them each as two spots that you slide through!

{width=60%}

Quincunx

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. I haven't done this pattern in at least 8 years, and I don't think anyone else in the MAJ has either. (Melonhead says he still likes it...)

Now that it's a part of the MAJ mythology though, we can't take it out of the pattern book. Maybe you should try it for yourself and see what you think!

\footnotesize

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| **Juggler/beat** | **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 |
```

\normalsize

> * Right-handed 4-count
 > * Lines indicate passes; arrows indicate movement.

{width=65%}

Pattern by Mike Newton.

Ivy\$-\pi\$ weave (read ivy pi weave)

Here's a variation on the $2\pi/3$. We figured it out by adding one and then a second feeder to fill the gap in the 3-person pattern. Then we noticed you could have everyone move through all the positions. Pretty fun.

First tried Aug 27, 2017 by Mike, Mel, Conor, Nick, and Jason.

We do this on a 4-count base, which keeps 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.

El Turbo plus one post

Refer back to 4-person El Turbo. In variations see on adding one or two 4-count stationary posts.

Positions: shaded=pass

Beat\Juggler	A	B	C	D	E
1	1	3	5	2 ⁻	5 ⁻
2	1 ⁺	3	1 ⁻	2	5
3	4 ⁻	3	1	3 ⁻	5
4	4	1 ⁻	1 ⁺	3 ⁻	5
5	5 ⁻⁻	1	2 ⁻	3	5
6	5 ⁻	1 ⁺	2	3	1 ⁻
7	5	4 ⁻	3 ⁻⁻	3	1
8	1	4	3 ⁻	1 ⁻	1 ⁺
9	2	5	3	1	2 ⁻
10	3	1 ⁺	2	3	1 ⁺
11	3	4 ⁻	3 ⁻⁻	1 ⁻	2
12	3	3	4 ⁻	3 ⁻⁻	
13	3 ⁻	2	4 ⁻	1 ⁻	3 ⁻
14	2	4	1 ⁺	5 ⁻	3
15	1	4 ⁻	5	5	3
16	3 ⁻	1 ⁺	4	5	1 ⁻
17	3	2 ⁻	5 ⁻	5	1
18	3	2	5 ⁻	1 ⁻	1 ⁺
19	3	3 ⁻⁻	5	1	4 ⁻
20	1 ⁻	3 ⁻	5	1 ⁺	4

Make sure you have mastered the regular **egg-beater** before you attempt this riskier version! In this variation all jugglers do the same sequence, shifted in time, and they move through all the 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 (positions **3** and **5**). The handle position (**1**) passes to receivers in positions **2** or **4**, and on their turn they pass

and move out immediately in order to clear the next pass that occurs between positions **3** and **5**. That special pass/move role is indicated in the table with **1⁺**. 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 1-spot and miss their opportunity to move down to **2** and **4**. In the position diagram, the shaded numbers are where passes happen; the negative superscripts indicate one or two passing beats preceding the pass at the numbered spot. For

instance, juggler **E** starts in **5-**, two `steps` before position **5** where he/she will pass on the third beat.

Extra Club Moving 5 Person Patterns

Twister Plus

In this beautiful variation of the Twister Weave the feeders replace their right-hand selves with triple passes back and forth over the top of the weave, in 7-club 4-count style. The weaving pattern is exactly the same as the Original Twister Weave.

Juggler/beat	**1**	**2**	**3**	**4**	**5**	**6**	
-----	-----	-----	-----	-----	-----	-----	
X	A	T-Y	C	T-Y	B	T-Y	
Y	T-X	B	T-X	A	T-X	C	
A	X			Y			
B		Y			X		
C			X			Y	

> * Right-hand counting

> * Y starts with 4

Another nice variation is for the weavers to do $\frac{1}{2}$ pirouettes under a triple right to left self throw for their turn.

Also see Twister++ and Twister 5.

Pattern by MAJ.

Double Time Twister Plus

Here is a twister variation with 2 extra clubs where the passes to and from the weave are all doubles like an extra club feed.

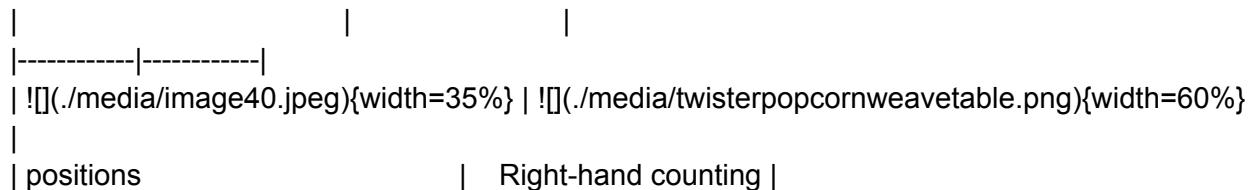
Juggler/beat	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
X		D-A		D-C		D-C		D-B		D-B		D-A
Y		D-B		D-B		D-A		D-A		D-C		D-C
A	D-X		D-X				D-Y		D-Y			
B			D-Y		D-Y				D-X		D-X	

| **C** | D-Y | | | D-X | | D-X | | | D-Y | | |

- > * Both hands counting
- > * A and C start with 4
- > * A, B and C start with right hand
- > * X and Y start with left hand

Pattern by Luke Emery and MAJ.

Twister Popcorn Weave



- > * and C start with 4
- > * A, B and C are 1 beat after X and Y

Pattern by Luke Emery.

Isla Vista Weave

This is the same passing pattern as the Stationary Isla Vista Weave, but instead of a circle, the jugglers start in two rows facing each other: a top row of 3 jugglers and a bottom row of 2 jugglers. The bottom row positions take turns doing a 2-count feed while rotating through a figure 8 shape.

The figure below shows the general motion, the arrows indicate the 2-count feeds:



Mango Swirl/Mangled Squirrel

- * 5 jugglers: all good with 7-club 2-count passing and moving
- * Positions: 2 facing 3, as above in Chocolate Swirl
- * Continuously, juggler on end of 3-line switches sides creating flipped 2-facing-3

The Mango Swirl was an attempt to create a change sides pattern for the 2 extra club W pattern. Unfortunately, our first attempts were more mangled than mango,

and more squirrelly than swirly and thus its alternate name. There are a couple possible transitions. Although we originally created the pattern with a different transition, this one seems easier (especially if you've practiced the Extra Club Turbo).

\footnotesize

Juggler/beat	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**				
11	**12**													
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----			
A	D-D		D-C		D-C	**Move**			T-B	Pause		D-E		
B	(D-E)		D-D		D-D		D-C		D-A		D-A			
Move														
C			T-A		Pause		D-B		D-B		D-E		D-D	
D			D-A		D-B		D-E		D-E	**Move**		T-C		
E			D-B	**Move**			T-D		Pause		D-C		D-C	
Juggler/beat	**13**	**14**	**15**											
A		D-E												
B			T-E											
C			D-D	**Move**										
D	Pause		D-A											
E	D-A		D-B											

\normalsize

- > * Both hands counting, right hand passes
- > * A and B start with 4, right hands
- > * C starts with 3, right hand
- > * C, D and E start with 3, left hands

In steady state, B is on a pause for beat 1, but throws D-E at the very start.

In steady state, C moves on beat 1, but is in initial position for beat 1 at the very start.

E moves first by turning around and passing a triple to D. A moves second by moving to the opposite side and throwing a triple to B, and so on.

The rhythm is: move, triple pass, 2 doubles to one, 1 double to the next, 2 doubles to the next. And repeat. Remember: *Triple-2-1-2.*

Yeah, it's kind of tricky. You can also add two more jugglers, one to each end, to get *Triple-2-1-2-1-2*!

Pattern by Luke Emery

Luke's Egg Beater Plus

Change the long passes to and from the feeder to triples to get this impressive looking pattern.

Juggler/beat	**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									

> * Right-hand counting

> * A starts with 4

Whirling Melvish

Consider a 14 club box in 4-count. There's room in the middle for one or two jugglers. If they pass with each of the corners while turning slowly in a circle, that's the Whirling Melvish.

To make it easier, the Melvish (the juggler in the middle, who may or may not be named Melonhead), can do 2 passes in a row to each corner.

\footnotesize

Juggler/beat	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	
----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- -----												
----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- -----												
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												
T-B												
M D-B Pause A D-B Pause												
M												

\normalsize

> * Both hands counting

- > * A and B start with 4 clubs
- > * A, C and M start with right hand
- > * B and D start on 2 with right hands

A single transition takes from beat 1 through beat 9. At 10 it starts over with the next corner.

The Melvish passes a straight double, pauses and then does a normal 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. Wait for 1 beat, then resume the 4-count. Moving after every 2 passes (1 double and 1 single) is a nice timing.

You can add an additional 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.

Pattern by Luke Emery, 2000.

Cathedral



The Cathedral is an extension of the GDP to 5 jugglers. It is a 4 leaf clover with 2 extra clubs and all triple passes over the top. This is a spectacular pattern, but challenging.

The outer box maintains a 14 club box in 4-count triples.

The center juggler passes once with a leaf and then replaces that leaf in a 6-count turn. The table below shows one transition, where E replaces A, and A completes the transition facing B.

\footnotesize

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| **Juggler/beat** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| **12** | **13** | **14** | **15** | **16** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **A** | T-C | | E | | T-C | | | | | D-B | Pause | | |
| | |
| **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 | Pause | | | | T-C | | | T-C | |
| | | \normalsize

- > * Both hands counting
- > * Beats 1 through 9 make up a single transition.

Pattern by Luke Emery, 2000.

Twister Popcorn

The Twister Popcorn is the same as the Popcorn Feed except there are 2 feeders, one on each side, and each popcorn feedee passes to one, turns to pass to the other, and repeats. The feedees do not weave in this pattern. That's the next pattern. In this pattern they just turn in place. The feeders do a Typewriter Feed.

{width=35%}	{width=60%}
positions	Right-hand counting

The hardest position is the middle feedee, 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 $\frac{1}{2}$ pirouette underneath it, or throw a behind the back self to turn.

- > * X and C start with 4
- > * A, B and C are 1 beat after X and Y

It's probably best to be quite comfortable with popcorn feeds before spending a lot of time on this pattern.

Pattern by Luke Emery and MAJ.

The Pollinator (5 or 6)

Six Person Patterns

Stationary Six Person Patterns

Extra Club Stationary Six Person Patterns

Moving Six Person Patterns

Extra Club Moving Six Person Patterns

Patterns for an indefinite number of jugglers!

...an idea whose time has come...like

Pattern Statistics

