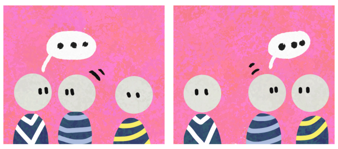
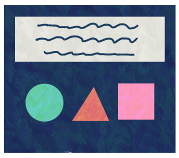
Conversation-based Interaction



This pattern utilizes dialogues or conversations to denote a particular action in the code. For instance, a question in the conversation may be used to indicate calling/invoking a function.

Narration-based Explanation



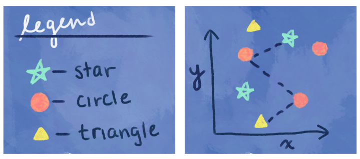
This pattern adds an explanatory text (narration) within the panel. It is useful when you need to communicate with readers directly. E.g., to explain each step/action of a process.

Character-based Explanation

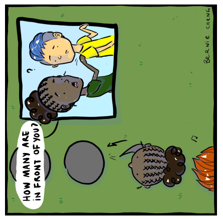
THIS is an APPLE!
THIS is a PEAR!

This pattern shows a character narrating and explaining the concept. It is similar yet different from narration-based explanation as it is the character (not you) interacting with readers.

Legend

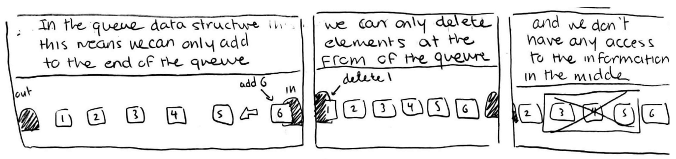


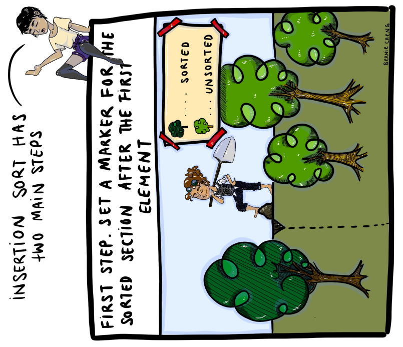
This pattern shows a legend panel within a panel or in a standalone panel. The legend panel is used to inform what the particular annotations (e.g., color, symbols) mean. It can be used to help readers understand how they should interpret your annotations.


HOW MANY ARE IN FRONT OF YOU?
?
BERNIE CHENG

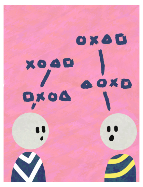
HOW MANY ARE IN FRONT OF YOU?
?
BERNIE CHENG

HI, EVERYONE! I'M BACK WITH MORE HOUSEHOLD TIPS. TO CONSERVE WATER, TRY TURNING OFF YOUR SHOWER BEFORE YOU LEAVE HOME.
SICK OF CHANGING THOSE SMOKE DETECTOR BATTERIES? ELIMINATE ANY FIRES IN YOUR HOUSE AND THE BATTERIES MAY LAST FOR MONTHS OR YEARS!
BEEP BEEP BEEP
TIRED OF CLOGGED TOILETS? TRY LEAVING THE LID ON THE UPPER CHAMBER AND USE ONLY THE LOWER BOWL!
FRESH AIR DOESN'T HAVE TO BE EXPENSIVE. MANY WINDOWS CAN BE SLID UPWARD TO CREATE A TEMPORARY HOLE WITHOUT THE USUAL COST AND CLEANUP!


In the queue data structure
this means we can only add to the end of the queue
out
1 2 3 4 5 6
add 6
in
we can only delete elements at the From of the queue
delete 1
1 2 3 4 5 6
and we don't have any access to the information in the midde
2 3 4 5 6

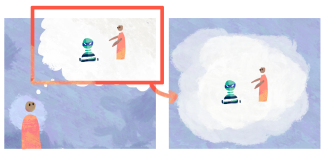

INSERTION SORT HAS two MAIN STEPS
FIRST STEP. SET A MARKER FOR THE SORTED SECTION AFTER THE FIRST ELEMENT
..... SORTED
..... UNSORTED
BERNIE CHENG

Conversation-based Explanation



This pattern embeds the explanatory text from the perspective of the characters. This is useful when you wish to explain certain things within the context of the story. E.g. to explain each step/action of a process within the story setting.

What-If

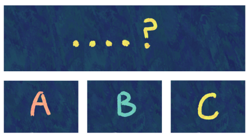


This pattern shows an additional panel(s) within a panel to demonstrate other potential outcomes. It allows readers to see the two possible results for each condition and which one ends up happening. The pattern may be useful when you have two different possibilities, and one of them may be more favorable than the other--which the character ends up selecting.

Comparison

This pattern shows a question in-between two things being compared to each other. It allows readers to easily identify which two things are being compared, as they are placed next to each other. It is useful when you want the take away to be a particular aspect being compared.

Alternatives



This pattern emphasizes the existence of many different cases. Thus it is used more like a summary/overview than as a presentation of a particular case.

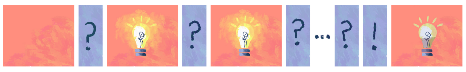
WHO HOLDS REAL POWER IN THE DEPARTMENT?
THE EMBATTLED DEPARTMENT CHAIR?
THE ENTRENCHED FACULTY?
THE HOT-SHOT NEW ASSISTANT PROFESSOR?
THE DEPARTMENT ADMINISTRATOR?
THE GRAD STUDENTS WHO DO ALL THE WORK?
(ANSWER: NOT THE GRAD STUDENTS)
www.phdcomics.com
JORGE CHAM © 2004

WHO is TALLER?
?
BERNIE CHENG

Is-It

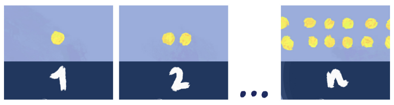
This pattern shows a character or object engaging in quick reflection to check whether a given condition is true or not.

Conditional Repetition



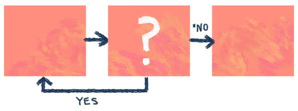
This pattern shows multiple panels with questions repeating during the sequence, ending with an exclamation mark. It is an easy way to display several (validation) steps. Also, although it requires many panels, showing each step has many benefits over skipping them, as novice learners have difficulty visualizing each step on their own.

Counted Repetition



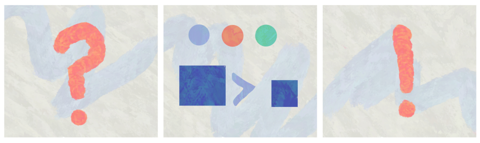
This pattern shows panels with numbers on them, with each panel representing each iteration. It allows readers to see what is happening during each iteration.

Flowchart



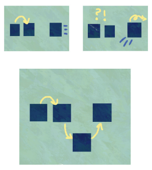
This pattern leverages the flowchart to show all the possible sequence of events. It is useful for showing all cases in a simple graph or how a character would reach a decision.

Question & Answer



Question & answer starts with a question and then shows an answer or eventual resolution. It engages an audience by dropping a hint of the contents that are going to present in the comic. Usually, it can elicit readers' curiosity and motivate them to continue reading until they find an answer.

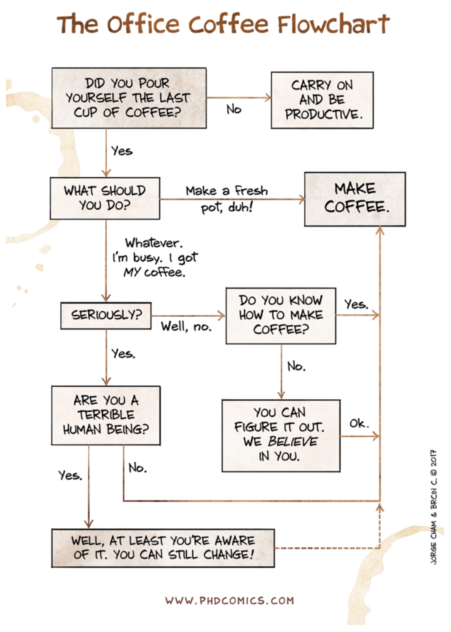
Multiple Scenarios



This pattern shows multiple usage scenarios. You may use this to inform various use cases of this concept.

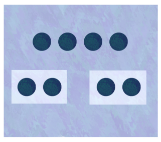
Lens

This pattern zooms in and allows readers to look at the detail interactions and conversations between the characters/objects. Conversations and interactions can provide readers a chance to observe each execution step in more detail (often annotated by texts) within the global context.


The Office Coffee Flowchart
DID YOU POUR YOURSELF THE LAST CUP OF COFFEE?
No
CARRY ON AND BE PRODUCTIVE.
Yes
WHAT SHOULD YOU DO?
Make a fresh pot, duh!
MAKE COFFEE.
Whatever. I'm busy. I got MY coffee.
SERIOUSLY?
Well, no.
DO YOU KNOW HOW TO MAKE COFFEE?
Yes.
Yes.
No.
ARE YOU A TERRIBLE HUMAN BEING?
YOU CAN FIGURE IT OUT. WE BELIEVE IN YOU.
Ok.
Yes.
No.
WELL, AT LEAST YOU'RE AWARE OF IT. YOU CAN STILL CHANGE!
WWW.PHDCOMICS.COM
JORGE CHAM & BRON C. © 2017

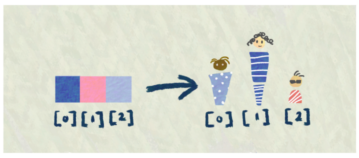
TICKE
OH! NO ONE IS IN FRONT OF ME!
BERNIE CHENG

Grouping



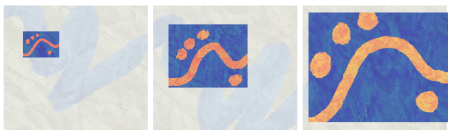
This pattern classifies objects into different groups. The grouping pattern is useful for showing the relationship between the objects and highlight the difference between different groups. E.g., the objects belong to the same execution process. It is especially useful when there are multiple execution processes.

Visualization



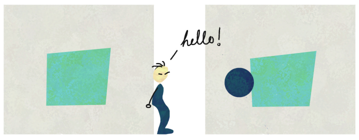
This pattern shows the relationship between the characters or objects in the story by embedding them in visualizations commonly used in computing education to illustrate data structures or algorithms.

Zoom



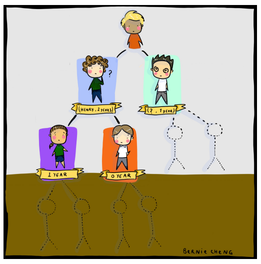
This pattern shows multiple panels, with each panel gradually zooming into a particular area. It signals to readers that you are going to shift your focus to a specific area/aspect of a concept.

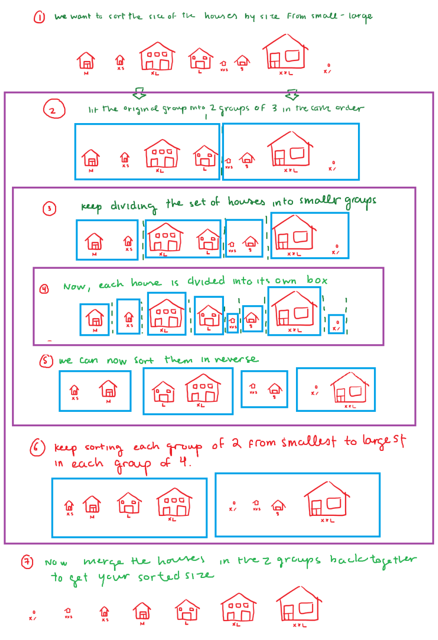
Break-the-fourth-wall

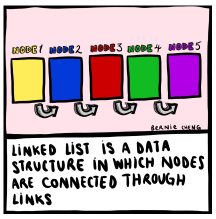


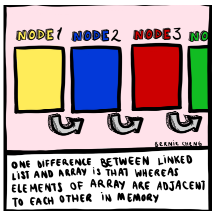
This pattern shows a character outside its world (panels). It is a creative, dramatic technique often used in films. This design pattern can allow characters/objects to display an awareness of readers and/or interact with them, making the reading experience fun and engaging.

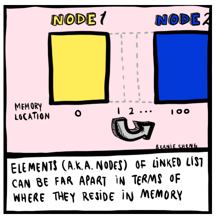
?
(HENRY, 2 YEARS)
(? , 1 YEAR)
1 YEAR
0 YEAR
HENRY'S MENTEES
BERNIE CHENG


?
(HENRY, 2 YEARS)
(? , 1 YEAR)
1 YEAR
0 YEAR
BERNIE CHENG

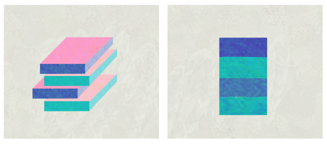

1 we want to sort the size of the houses by size from small - large
M
XS
XL
L
XXS
S
XXL
X/
2 lit the original group into 2 groups of 3 in the same order
3 keep dividing the set of houses into smaller groups
4 Now, each house is divided into its own box
5 we can now sort them in reverse
6 keep sorting each group of 2 from smallest to largest in each group of 4.
7 Now merge the houses in the 2 groups back together to get your sorted size


NODE1
NODE2
NODE3
NODE4
NODE5
BERNIE CHENG
LINKED LIST IS A DATA STRUCTURE IN WHICH NODES ARE CONNECTED THROUGH LINKS


NODE1
NODE2
NODE3
NO
BERNIE CHENG
ONE DIFFERENCE BETWEEN LINKED LIST AND ARRAY IS THAT WHEREAS ELEMENTS OF ARRAY ARE ADJACENT TO EACH OTHER IN MEMORY

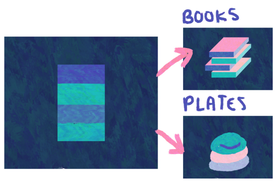

NODE1
NODE2
MEMORY LOCATION
0
1 2 ...
100
BERNIE CHENG
ELEMENTS (A.K.A. NODES) OF LINKED LIST CAN BE FAR APART IN TERMS OF WHERE THEY RESIDE IN MEMORY

Abstraction



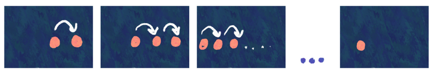
This pattern shows readers the abstract representation of real-life objects, forms, or structures that were present in the story. It helps readers see that they can remove concrete details in real-life objects, shapes, or structures to derive abstract representations.

Concretization



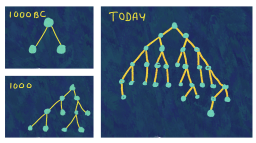
This pattern shows readers various concrete representations of an abstract concept. By doing so, it helps readers to see how a given concept can generalize and can be found in things we are already familiar with.

Gradual Reveal

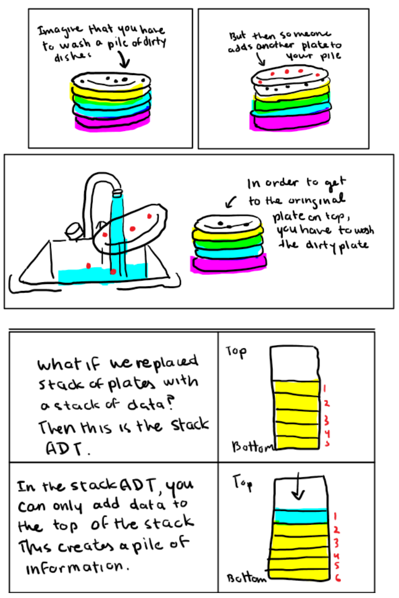


This pattern first focuses on a particular part of the whole picture and gradually reveals the entire picture. It is often useful for engaging the audience.

Moments

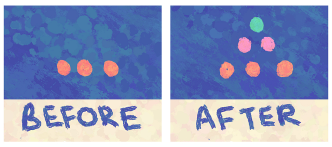


This pattern presents the states at different times and places them next to each other. It is useful for highlighting the important states in the execution process.


Imagine that you have to wash a pile of dirty dishes
But then someone adds another plate to your pile
In order to get to the oringinal plate on top, you have to wash the dirty plate
what if we replaced stack of plates with a stack of data? Then this is the Stack ADT.
Top
Bottom
1
2
3
4
5
In the stack ADT, you can only add data to the top of the stack This creates a pile of information.
Top
Bottom
1
2
3
4
5
6

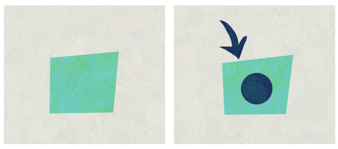
THIS IS HOW IT ALL STARTED...
MOM, CAP'N CRUNCH IS THE BEST CEREAL! I CAN EAT IT EVERY DAY FOR 100 DAYS!!!!!!
OH, IS THAT SO?
BERNIE CHENG
DAY 1...
SO GOOD!
DAY 50...
MOM, I AM GONNA PUKE...
DAY 100...
I'M DONE WITH CAP'N CRUNCH FOR THE REST OF MY LIFE!
YOU DID IT!
BERNIE CHENG

Before/After



This pattern shows two panels: before and after the application of a concept. This helps readers immediately find out what happens if a concept is applied, without requiring them to read minute details in the process.

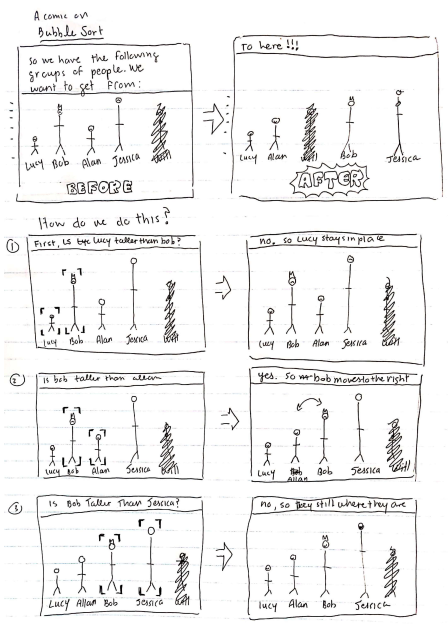
Assign

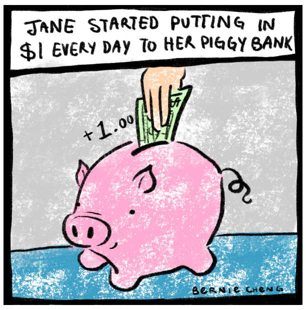


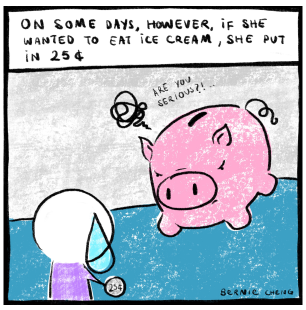
This pattern shows the states before and after the assignment and annotates the assignment action with text or other ways. The assign pattern shows readers that something is actively being placed into somewhere for storage or for later use.

Passing on

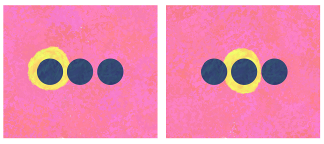
The pattern illustrates the transfer of a data/object between two characters. This pattern helps show when a piece of information is being passed on from one place to another. For instance, when illustrating the parameters of a function or variable assignments.


A comic on
Bubble Sort
so we have the following groups of people. We want to get from:
Lucy Bob Alan Jessica Will
BEFORE
To here!!!
Lucy Alan Will Bob Jessica
AFTER
How do we do this?
① First, is ~~the~~ Lucy taller than bob?
Lucy Bob Alan Jessica Will
no. so Lucy stays in place
Lucy Bob Alan Jessica Will
② is bob taller than allan
Lucy Bob Alan Jessica Will
yes. so ~~Al~~ bob moves to the right
Lucy ~~Bob~~ Allan Bob Jessica Will
③ Is Bob Taller Than Jessica?
Lucy Allan Bob Jessica Will
no, so they still where they are
Lucy Alan Bob Jessica


JANE STARTED PUTTING IN $1 EVERY DAY TO HER PIGGY BANK
+1.00
BERNIE CHENG

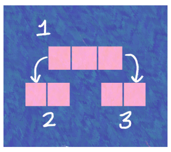

ON SOME DAYS, HOWEVER, IF SHE WANTED TO EAT ICE CREAM, SHE PUT IN 25¢
ARE YOU SERIOUS?!..
25¢
BERNIE CHENG

Highlighted Transition



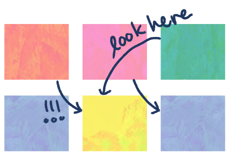
This pattern shows the state of all objects and highlights an object being acted on at that particular panel. Compared to the “Numbered Transition” pattern, it requires more panels. But it helps the process become more concrete.

Numbered Transition



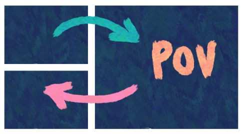
The state changes on different time are shown on the same panel by using numbers to annotate the sequence of state transitions. As opposed to “Highlighted Transition”, this pattern saves space but demands readers to visualize the transitions in their head.

Annotated Transition

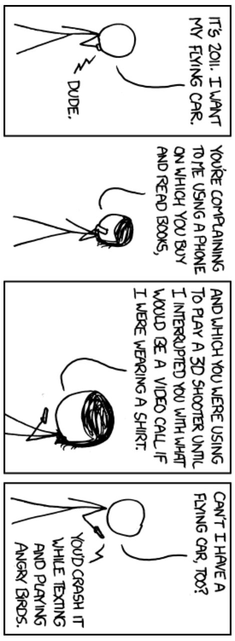


The pattern shows the states with annotated actions. It is used to clarify the actions in the story. It is especially useful when the state changes are complicated, and the characters take different steps.

Point-of-view Switch



This pattern switches the focus of the narrative from one character to another. It is useful for highlighting different execution process, e.g., function calls or context switch.


IT'S 2011. I WANT MY FLYING CAR.
DUDE.
YOU'RE COMPLAINING TO ME USING A PHONE ON WHICH YOU BUY AND READ BOOKS,
AND WHICH YOU WERE USING TO PLAY A 3D SHOOTER UNTIL I INTERRUPTED YOU WITH WHAT WOULD BE A VIDEO CALL IF I WERE WEARING A SHIRT.
CAN'T I HAVE A FLYING CAR, TOO?
YOU'D CRASH IT WHILE TEXTING AND PLAYING ANGRY BIRDS.