AN INTRODUCTION TO VISUAL VARIATION FOR BETTER LEADING, LEARNING, AND LIVING

The Powerful Principle for
Clear Explanations and Creative Explorations
in Business, Society, and Life

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PREFACE

"You should make things as simple as possible, but not simpler."

Albert Einstein

We live in complex times, where our ability to keep up with new approaches, concepts, or discoveries is often put to the test. It's not just that life is getting more complex; we are also witnessing an accelerated growth of knowledge. Examples of this trend abound – from learning about the latest blockchain or artificial intelligence applications, understanding viruses and their mutations, or mastering the newest social media marketing tools to comprehending climate change and its mitigations.

So, what can we do to cope with this increasing need for rapid understanding?

What is a good way to clarify complex issues concisely?

How can we learn more swiftly, keep our focus, and share what we have learned with others more seamlessly?

Is there an approach that not only helps us represent current insights but even allows us to go beyond them and actually fosters creativity?

Yes, there is.

In this book, we present a time-tested approach for clarifying the complex, and this for the first time in a systematic, accessible, and entertaining manner.

We call this approach Visual Variation, a powerful principle to make the complex clear and think beyond the obvious.

The visual variation principle introduced in this book is backed by years of rigorous academic research into learning and knowledge representation. It has been tested in dozens of projects and application contexts, ranging from education and business to personal to societal issues.

It is quite probable that you have already come across several examples of visual variation in magazine articles, online blogs, textbooks, presentations, internet memes, or instructional videos, without noticing the underlying mechanism or paying attention to this powerful principle – and what it could do for you.

This concise book shows you how the visual variation mechanism works and how it can be used for more effective learning, teaching, communicating, or ideating. It does so with the help of examples ranging from business and personal to science and culture.

Our hope is that these instructive examples, together with our clear set of instructions, enable you to represent insights visually, even if you do not know how to draw or use sophisticated graphics software. We believe that visual variation will allow you to develop ideas more swiftly and more collaboratively – thanks to the useful suggestions and constraints that the principle provides. So, whenever you face a challenging problem or have to explain a complex issue in a short amount of time, don't worry – vary!

Let us know how visual variation has worked for you. Share your thoughts, prototypes, or improvements with us, and be sure to check out the additional examples and the variation vanguard at www.visualvariation.com. This website also provides an opportunity to see the visual variation approach in action and connect with like-minded others. We wish you many happy discoveries on your variation voyage.

St. Gallen, February 2022
Martin J. Eppler

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INTRODUCTION

VISUAL VARIATION FOR CLARIFICATION

In this short chapter we introduce the visual variation paradigm and its background. We show examples of how this looks in practice, as well as the key principle behind it. You will also learn for whom this approach is useful and in which situations you can use it.

"You do not understand anything, until you understand it in more than one way."

Marvin Minsky (MIT professor, artificial intelligence pioneer, cognitive scientist)

This is a book unlike any other that you may have read before.

This book is not just read.

It's viewed, explored, pondered, inscribed, modified, and extended, rather than simply read.

It's not a book about a singular topic, tool, or domain; it's about a universal principle that you can apply to many (and we mean many!) radically different contexts. This principle is called visual variation. Visual variations are to qualitative information what bar charts are to numbers – a universal, simple and concise format to represent insights visually.

This book is about a clever way to think and communicate – through images. It's about a way to approach *complexity through simplicity*. It's a book about the value of multiple perspectives and how to build variation into your routines, whenever explaining something, solving a problem, or trying to understand a complex phenomenon. Visual variation is a way to frame an issue in multiple ways – simultaneously.

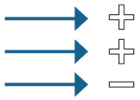
As mentioned in the preface, we see an unprecedented rate of change in business and society. We truly live in a VUCA world that is characterized by volatility (fluctuating circumstances and prices), uncertainty, complexity (i.e., many dependencies and chain reactions), and a high degree of ambiguity (i.e., multiple possible interpretations of the same situation).

2.2 THE PATTERNS OF VISUAL VARIATION

If you want to construct a visual variation for a given topic, you need to reflect on which pattern or type of variation is best. You can choose from one of the five following patterns:

- Pick the APPROACHES pattern if your topic is about reaching a specific goal and if there are several (useful or misguided) ways to achieve it. This is a good pattern for problem-solving, creativity, or general training/instruction.
- Choose the SCENARIOS pattern if you want to prepare for eventualities and anticipate possible deviations from a devised plan. This is a good pattern to support planning, risk management, and decision-making.
- Try the SEGMENTS pattern if you want to show different types of phenomena in real life in terms of their different compositions. This is a useful pattern for phenomena with a particular duration or temporal dimension (e.g., projects, meetings, presentations, stories, events, etc.).
- Apply the CONFIGURATION pattern if you want to show how different situations call for solutions that consist of the same elements – but are differently arranged. This advanced pattern works well with audiences already familiar with the topic.
- Use the MUTATION pattern if you want to foster creativity or show the evolution of something over time (or how it could develop in the future). This is a good pattern to instruct a wide variety of audiences in an entertaining and imaginative way.

Let's explore each pattern a bit more in detail in the next table and the following examples. Below we list the five patterns in order of their difficulty (but also, to some degree, frequency of use), mentioning each one's main goals, elements, graphic representation format, examples in this book, and key benefits:

1. THE APPROACHES PATTERN 

1. Goal: To differentiate fruitful and problematic approaches to reach the same aim.
2. Elements: Problem-Approach-Result.
3. Typical visualization: 3-part-horizontal sequence with arrows.
4. Examples: 4 cognitive styles, reactance communication, dealing with setbacks.
5. Benefits: Simple, memorable, opening up options, also shows what not to do.

2. THE SCENARIOS PATTERN 

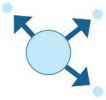
1. Goal: To show possible deviations from an intended plan
2. Elements: Plan-Reality
3. Typical visualization: 2 arrows (one planned, one potential)
4. Examples: How Strategies go astray, career pathways
5. Benefits: Understand contingencies, prepare for eventualities, anticipate developments

3. THE SEGMENTS PATTERN 

1. Goal: To highlight the different possible (functional or dysfunctional) partitions of a phenomenon.
2. Elements: Different segments in a sequence
3. Typical visualization: Bar chart segments or pie segments
4. Examples: Project pathways, meeting pathways, presentation structures
5. Benefits: Understand options or anticipate potential issues

4. THE MUTATIONS PATTERN 

1. Goal: To depict (often metaphorically) the evolution, progression, or variation of a phenomenon
2. Elements: Same thing in different stages of evolution
3. Typical visualization: Objects (at times as metaphors)
4. Examples: Fake news as hats, thinking outside the box
5. Benefits: Understand different types or maturity levels and create novel views or ideas

5. THE CONFIGURATIONS PATTERN 

1. Goal: To outline the different feasible arrangements of elements for solution designs
2. Elements: (Mostly) the same elements arranged differently
3. Typical visualization: Node-link diagrams
4. Examples: Leadership styles, negotiation types
5. Benefits: Understand how to adapt to different situations, understand complex situations and interactions, generate novel solutions

The best way to understand these patterns is through specific examples. So let's make use of each pattern for a compelling example.

The first example is of the *approaches* pattern and focuses on communicating complex issues. In psychology, this challenge is known as the curse of knowledge or the expert paradox. Once you have understood something complex really well, it becomes difficult to explain it to others who do not have that insight. You simply forget how complex the topic is and assume everybody 'gets' it. To overcome this barrier, the visual variation below gives you two pointers of what not to do and three better ways to communicate. It makes all this memorable through a simple variation of how to go from puzzled (on

the left) to informed (on the right side). So instead of emphasizing how complex a topic is or how well you master it, use simple examples first, connect with what your audience already knows and visualize it, adding complexity step-by-step. Before doing all of that, pre-check that it is comprehensible by communicating it to a colleague.

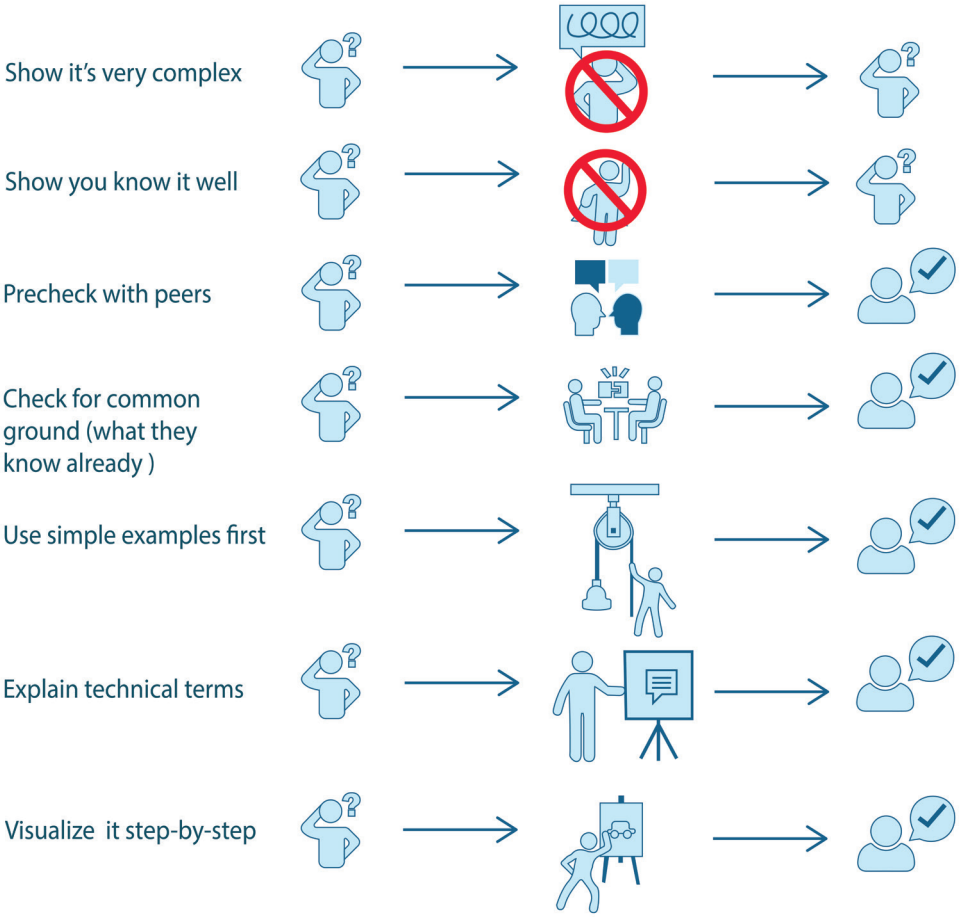


Figure 4: An example of the approaches pattern showing how (not) to explain complex content

As you can see from Figure 4, the approaches pattern often uses stick figures to illustrate its main messages. Drawing these figures in a rapid, simple, and yet versatile way is easier than you might think – especially with the help of the star man technique described in the box below (from our book 'Sketching at Work,' see Eppler & Pfister, 2018).

BOX: How to draw people quickly

In the APPROACHES pattern, especially, you may want to draw people quickly and in a flexible format. Based on the work of Milly Sonnmann and others, a technique for doing this that has gained some popularity is the star figure. It is simple to draw a person in various postures with this approach. The key is to leave out non-essential details and focus on the head and the contours of the body – in the form of a simple star. So, start with a simple circle and then connect a star-like silhouette on the left and end it on the right side of the head. Make sure your figure looks more or less symmetrical and that the proportions are roughly where they should be (unless you want to emphasize that somebody is big-headed!). You can vary this person by, for example, stopping at the middle on the right side and then drawing the right arm to raise or point at something. Last but not least, you can also add additional elements to the star person, such as hairstyles, hats, capes, tools, pockets, a halo, or devil's horns, etc. The alternative to drawing people is to use icons available online, such as those from thenounproject.com.

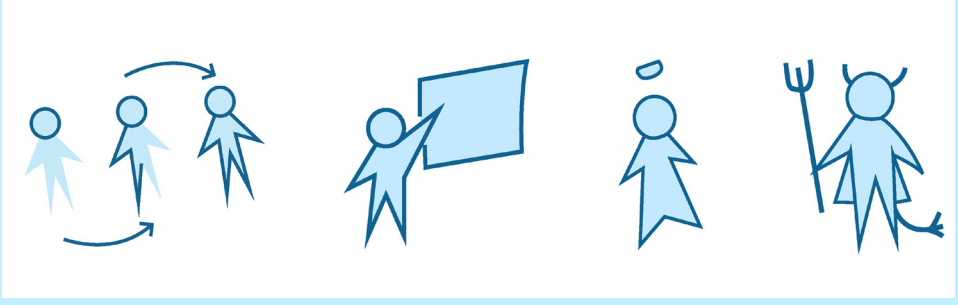


Figure 5: How to draw a person quickly for the approaches pattern

Turning now to the less cartoonish and more diagrammatic *scenarios* pattern, let us take as an example how business strategies may turn out in reality. Based on an idea from Henry Mintzberg (the world's foremost strategy guru), the illustration below depicts possible strategy implementation problems as deviations from an intended course. The blue arrow symbolizes this planned course of action, while the scenario is shown in black. In this way, many possible strategy implementation issues can be anticipated and (hopefully) avoided. Notice how the first six scenarios also act as a generative mechanism to think about further possibilities (both positive and negative). This is typical for a visual variation: visualizing is more important than the visualization. Or, in other words, a visual variation is not just a graphic representation; it is always an invitation to viewers to elaborate their own variations and think further. This is especially true for the scenarios pattern.

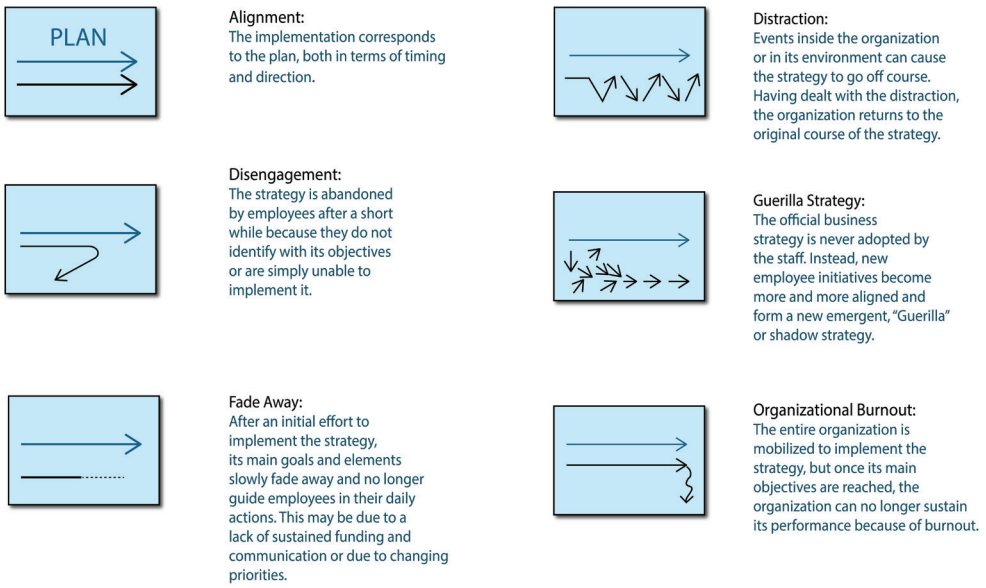


Figure 6: An example of the scenarios pattern: how plans go astray

Let's stick with the planning topic for a minute and examine it not in the strategy context but rather in project management. With the help of the segments pattern, we can distinguish different kinds of (mostly problematic) projects

and their main phases. Again, notice how the six variations provided are not just instructive caveats but also thought-starters to consider other kinds of problematic project constellations. To make this invitation (psychologists refer to it as an affordance) explicit, you can provide an additional empty bar at the end and ask your peers (for example, during a project kick-off workshop) to come up with their own segmentation of a project.

Working on a segment variation, it is important to make consistent use of color or shading for the respective sections of each bar. You may have seen that the different project phases always have the same color or hue throughout. This consistency factor is important in making the variation more easily 'readable.' Last but not least, you can vary the sequence of segments and their respective length – and the length of the entire bar chart. In the case of the lucky break example below, the project finishes earlier than planned. However, you need to be careful not to vary too many elements so that your segmentation still remains clear and communicates its content easily.

Segmented bar charts are not the only form of segment variations. You can also use simple pie charts for varying segments or even objects like drinking glasses or roads. The bar chart format is the most widely used, for example, in the famous 'anatomy' variations by John Atkinson (Google them, it's worth it).

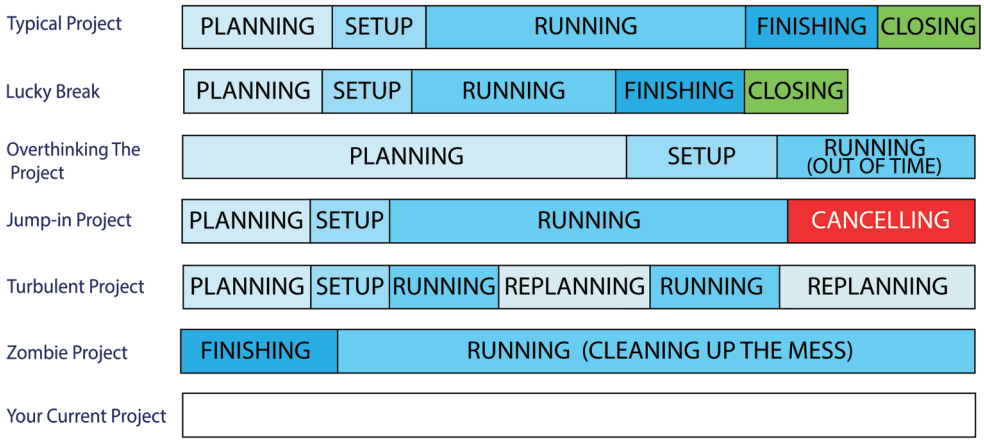


Figure 7: An example of the segments pattern: different project paths

in his law of the vital few (also known as the Pareto principle). So focus on the correct 20 percent of all possible activities, and this will get you to an 80 percent result (but achieving the final 20 percent might require the other 80 percent, which is sometimes needed).

3. Steven Covey reminds us always to start a new endeavor with the final goal in mind and align everything we do to that goal. This keeps us not only focused but also motivated.

4. This is one of the core credos of positive psychology (and stoic philosophy). Do not lament or complain, but instead focus on our resources and make the best use of them.

5. This is another from Steven Covey (who claims this is one of the traits of highly effective people) – create synergies among your goals. In other words, think about how you can tweak one goal so that it helps you with another. Here's an idea: Create a synergy between this book and your life and visualize your own life principles using visual variations.

Before closing this application chapter, think about which of the five variation patterns has resonated most with you. Then, I would encourage you to also give the others a try. The final information box below gives you some good pointers on how each can be used.

BOX: Taking the five patterns to work

An alternative logic for this chapter would have been to structure it entirely by the variation patterns and how you can make the best use of each one of them. That may be a more clear-cut distinction than the one between leading, learning, and living (which become ever more intertwined in today's world). You may also have particular preferences, such as the simple approaches pattern or the systematic configurations patterns. To allow for this or go beyond your current selections, you will find a few pattern-specific suggestions below as well as in the Appendix (in the Starter section).

Use the Approaches variation pattern whenever you…
- don't have a lot of time on your hands;

- want to keep it simple and accessible;
- want to show different ways to solve a given problem or reach an objective; or
- want to highlight what works and what doesn't.

Use the Scenarios variation patten whenever you...
- want to explore how things might turn out;
- try to think about possible problems or roadblocks;
- want to compare an ideal future to a probable future; or
- believe it's important to break free from the status quo.

Use the Segments variation pattern whenever you...
- need a diagnostic approach to a process, event, workshop, habit, or task;
- want to compare different sequences that lead to a specific result; or
- need to reflect systematically about the sequential elements of a solution (and if they could be arranged differently or some even left out).

Use the Mutations variation pattern whenever you...
- address a larger audience that might otherwise not pay attention;
- want to foster a creative way to think about a topic;
- want to instruct as well as to entertain;
- want your audience to extend the variation themselves creatively.

Use the Configuration patterns when you...
- don't have elaborate drawing skills;
- face an analytic or academic audience;
- want to emphasize a systematic and highly deterministic/deliberate variation;
- need an exhaustive variation which considers all the possible combinations that make sense.

APPENDIX

THE COGNITIVE PSYCHOLOGY OF VISUAL VARIATION: A PRIMER ON VARIATION THEORY

This appendix chapter describes the research behind visual variation and the elements and core insights of variation theory.

"Powerful ways of acting originate from powerful ways of seeing."

Marton and Tsui

If you are interested in the scientific background of visual variation, then this appendix is for you. First, we will briefly describe the origins and development of variation theory and present its main elements, benefits, and application areas.

Variation theory is a learner-centered approach to improve the quality of instructions. It has grown out of so-called phenomenographic studies that began in the 1970s and examined the learner experience (of study material and instructor behavior) during educational episodes.

In these empirical studies, a key element has surfaced repeatedly – understanding comes from seeing variations. When you experience a phenomenon in more than one way, you can begin to differentiate or *contrast* it from other things. You can determine its traits (those that change and those that remain the same) and *separate* them from the actual phenomenon. Eventually, you can generalize from these variations and infer higher-level insights from the experienced variations. You can also see how different traits change together (or not), a phenomenon called *fusion* in variation theory.

Learning in variation theory is, therefore, an expansion of awareness, more specifically in the awareness of critical aspects, differences, and invariances. More broadly speaking, we make sense of the world by *seeing the same thing in different variations.*

The key cognitive (or reasoning) processes through which we understand a complex phenomenon are the ones highlighted above: *contrast, separation, generalization, and fusion.* Ideally, a visual pattern of variation allows viewers to go through these cognitive mechanisms in a sequence, continuously build-

ing on the previous one to achieve the next, higher level of understanding or differentiation.

Let's take a simple example to make this somewhat abstract reasoning more tangible. How can you better understand the concept of a geometric angle?

In the image below, you first see an angle in its standard form (highlighted in blue) on the far left to start the visual variation. You then notice that the thickness of the lines does not affect it (in the second line with the identical blue angle), and neither does their length (varied in the third variation). You can understand the *contrast* between different line lengths and widths and that the angle remains the same throughout all these variations. You can *separate* the line properties from the angle property.

You then also discover that orientation has no impact on the angle (as you look at the fourth variation), and you can *generalize* that line properties or orientation do not alter an angle.

Last but not least, you see the angle in a slightly different context, namely as part of triangles where (in the sixth drawing compared to the fifth one) other properties (length, line boldness, and orientation) have now changed simultaneously (*fusing* your previous insights). In the last image, you see what a different angle would look like, as the two triangle lines are now diverging more than in the previous image. The variation has moved from contrast, separation, and generalization to fusion by constantly introducing additional changes. This is not a fixed requirement for a visual variation but it can enhance its didactic power.

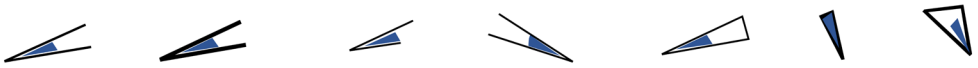


Figure 39: A simple visual variation to better understand the concept of geometric angles

The paradigm of visual variation explained above is based on many years of research on how we perceive the world and learn. It builds on the work of Gibson (1986) regarding perceptual psychology (how we start to differentiate when perceiving our environment) and on the seminal work by Marton and Booth (1997) regarding learners' experiences of their domain of study.

Since the 1990s, variation theory has been successfully applied to improve learning in such diverse fields as *economics, chemistry, mathematics, biology, literature, physics, language learning, and law*. It has been applied at various educational levels, from early primary school all the way to university. It is very much a "made for real-life" theory that has been extensively tested, evaluated (and criticized), and further developed since its inception in the mid-1990s. In that vein, visualization has not always played a prominent role in variation theory. Let's examine its role a bit more closely in the next section.

Marton and Booth suggest that a person is said to have learned with respect to a phenomenon when that person is "capable of being simultaneously and focally aware of other aspects or more aspects of a phenomenon than was previously the case" (Marton & Booth, 1997, p. 142). Visual variations help to achieve a gradual expansion of understanding by noticing differences and invariances, as in the angles example above. Marton and Booth explicitly refer to this as "ways of seeing" (Marton & Booth, 1997, p. 142). Marton, Dahlgren, Svensson, and Saljo (1977) conceived of this in their early studies "as a change in the eyes through which we see the world" (p. 23). The premise of variation theory is that powerful ways of acting originate from powerful ways of seeing (Marton & Tsui, 2004, p. 7).

This idea of bringing a concept to life through visual means and emphasizing its properties goes back much further than variation theory or the phenomenographic studies of the 1970s and 1980s. For example, the 17th-century British philosopher Thomas Hobbes suggested (like several other philos-

ophers including Aristotle, Baruch de Spinoza, and Ramon Lullus) that the construction of geometric figures helps us learn more about the properties of a concept. Hobbes thus conceived of thinking as a form of *artistic production* (Berger, p. 173), generating particular concepts materially with the assistance of visual aids (ibid.). Variation theory takes this idea a step further (also based on activity theory by Lew Vygotsky) by specifying how to visualize concepts so that they can increase our understanding.

Variation theory asserts that conceptual change depends on highlighting critical elements of a phenomenon by creating variation in these, while all other elements are held constant. Lo and Marton (2012) wrote: "The presence of variation creates a potentially *noticeable contrast* within or between one or more features of a phenomenon. Thus, to discern some aspect of a phenomenon, an individual must experience variation in that aspect. This experience of variation allows the learner to create meaning for the phenomenon."

This idea of *systematic variation* combined with graphic representations (even for non-material or conceptual topics) can create synergies that allow variation to be even more impactful and immediate. At the same time, visualization as a practice becomes more focused, simple, and streamlined through the variation constraint.

Although many examples in this book are directly inspired by variation theory, it is by no means the only source for the visual variation approach. Other key principles behind visual variation that should be mentioned are follows:

1. **Repetition** is a key principle of every learning approach based on cognitive psychology and the cornerstone of visual variations.
2. **The observation-question cycle:** First, we observe, then we try to ask why/and how. The visual variation approach feeds directly into these two steps also emphasized by Kolb's (2014) experiential learning theory.
3. **Scaffolding and activity theory:** When you have a support structure,

you can learn on your own and use this structure to build up understanding progressively, especially when this structure lets you substitute something abstract (like learning about a concept) with a tangible task (such as drawing or extending graphic variations). This is a cornerstone of the didactic thinking of seminal psychologist Lew Vygotski, and it is also at the heart of the visual variation approach.

4. **Cognitive load theory:** Sweller (2006) found that learning failures are often the result of excessive cognitive load on students and misdirection of attention. By first focusing on a simple graphic representation that is then (step-by-step) made more visually complex (with accompanying descriptions), attention can be better directed, and extraneous cognitive load can be kept to a minimum.
5. **Dual coding theory/picture superiority effect:** We remember something pictorial better than just a text or something we have only heard because we save it to our memory twice – content-wise and shape-wise. This makes it easier to bring to mind later (Paivio & Csapo, 1973, Paivio, 1986).
6. **The linguistic theory of graphic variation as social practice:** Professor Spitzmüller (2013, 2015) examined (the research-wise "neglected social practice" of) graphic variation from a linguistic point of view – not simply in illustrations, but mainly in the context of typography and layout. He suggests that graphic variation is a key cognitive mechanism for identity building and knowledge sharing. In his 2015 book, he explores the different forms of graphic variation and their functions, and he presents a typology of graphic knowledge that can be fruitfully exploited.

As the visual variation approach further matures and branches out, it might itself, in return, provide stimulation or enrichment to other theories, techniques, and approaches. Here's to a lively theoretical and practical debate about the forms, benefits, and limitations of visual variation as a generative individual and social practice!

→ VISUAL VARIATION PROCESS CHECKLIST

1. PURPOSE: Think about the **topic** you want to focus on in your visual variation and for whom it should provide value.
   - Key question: What do I want to show to whom and for what purpose? To explore or explain for myself or others, for beginners or intermediates?
   - Caveat: Delineate the topic adequately (correct level of granularity)

2. PATTERN: Pick one of the five **patterns** that best fits your topic and purpose. A pattern is a type of visual variation that we will explain in detail below.
   - Key question: Which format can best clarify the topic? Approach, scenario, segment, mutation, or configuration?
   - Caveat: Don't commit too soon to a pattern; try out two or more first.

3. PARTS: Identify the **elements** you want to show or explore and their relationships.
   - Key question: What are the essential topic parts to depict?
   - Caveat: Make sure the parts you choose are on the same level of detail and, if possible, there are seven elements or fewer.

4. PRESENTATION: Now **arrange** the elements visually in a meaningful way using self-explanatory icons or other graphic symbols.
   - Key question: How are the elements related?
   - Caveat: Try to make the graphic representation as simple as possible and self-explanatory (with as little text as possible).

5. PERSPECTIVES: Think about topic **variations** or different viewpoints on the topic and add a short text explanation to each.
   - Key question: Which types or versions should I distinguish?
   - Caveat: Don't overdo it; focus on the 3-10 key variations.

6. PROGRESSION: Put the variations in a logical and meaningful **sequence** (usually from top to bottom)
   - Key question: In what order should I show the types?
   - Caveat: Make the logic explicit – is it from bad to good, or simple to complex, or certain to uncertain? You can do this through color-coding, symbols, or text elements.