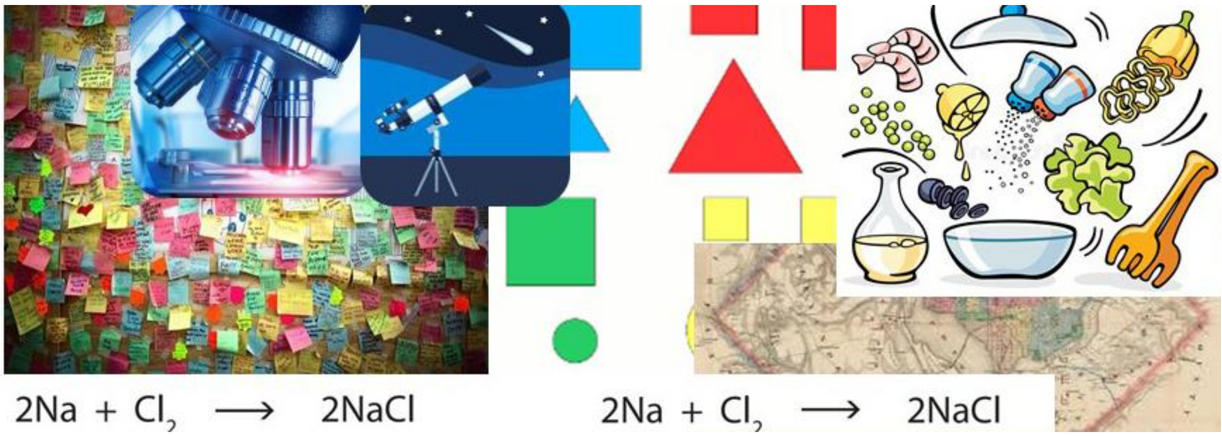
Mise en place



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Solving any complex problem, we naturally look for patterns to help simplify matters. Patterns of occurrence are suggestive of predictability in an otherwise messy 'Where's Waldo' world. But how do we isolate and order factors to make solutions easier to find? Hint: size matters.

Remembering my former research laboratory, I commonly used a specialized software program to scale microscopic neurons for analysis. Scaling is my best technique for identifying neurons and making them fit into the intricately complicated scheme of the central nervous system. Later I learned that astronomers also use this very same program applied to the opposite end of the size scale, measuring distant planets and galaxies on the order of parsecs. Neurons measured in micrometers (10^-6 meters) to galaxies measured in parsecs (10^16 meters), the comparative scaling spans a whopping 24 orders of magnitude.

All factors associated with any given problem are not equivocal, but they must be compatibly scaled relative to each other. From microscopes to telescopes and instrumentation detecting various physical entities sized in between, consistent scaling provides the mathematical basis for interpreting the natural world. Scaling not only defines entities, but makes the associated data workable within the greater context of known information. Morphology aside, the most obvious descriptive difference between an elephant, nematode and a quark is their respective size. Without scaling, further investigations are effectively moot. On a relatable domestic note, cooking is a prime example wherein proportional scaling really matters.

Mise en place, in French "putting in place," describes the preparatory process of organizing and assembling all the ingredients before the actual cooking even starts. Even fixing a salad necessitates that all ingredients are edibley proportional to each other. You would not toss a whole cucumber into a salad, after all.

If you are making a casserole, for example, the goal is to have all the ingredients cook uniformly, finishing at the same time. The problem is that all the ingredients are fundamentally different. Lamb cooks at a different rate than the same volume of peas. Denser vegetable such as rutabagas and carrots need to be chopped finer than mushrooms. Certain ingredients are par-cooked to compensate for the cooking time so that the casserole is uniformly done when the kitchen timer rings. Missing any of these steps, the recipe fails.

Mise en place applies to chemistry too. Solving chemical equations, the first step is to convert all the molecular formulae and states of energy/matter into usably proportional scale. These conversions, known as dimensional analysis or unity fractions, just means consistency in measurement. Grams per mole, volumes expressed in milliliters and energy units in Joules, for example. Mismatched equations do not work. Once all entities are in proportional bite-sized chunks, entities can then be accurately compared and solving becomes pretty easy. Mathematics too.

Pop quiz. Evoking test taking nightmares, solve this equation in under 30 seconds without peeking at your calculator. Go.

[(7*10^21 + 11*10^9) / (6*10^12)] * (10^42)^-1

Factors in this convoluted, ungainly equation can be rescaled such that solving it is a cinch → (7 + 11) / 6 = X.

The unequivocal first version was scaled in sextillions, billions and trillions, respectively, then the latter equation with the same integral numbers (7, 11, 6) was simplified into easy factors, *mise en place*. The answer is X = 3.

Related, a cake recipe calling for 96 teaspoons of flour. Really? Imagine laboriously measuring out 96 teaspoons, invariably altering the total quantity since so many spoonsful are iteratively imprecise (or just losing count). *Mise en place*, 96 teaspoons equals 2 cups.

Like quantifiable physical entities, so too ideas can be similarly scaled for analysis. Related, psychologists have their own version of *mise en place*: the notion that factors within our environment define the possible parameters of how we might act. Basically, this means your recipe is confined by the readily available ingredients.

- Related side note → You know the old adage, 'You cannot see the forest for the trees' yes? I guess, but what if you do not have the map, devoid of an aerial view? As an Alaskan, I really have been lost in the forest. Examining the trees, their clues being identifiable patterns with directional markers, I can and will find my way.

Later shifting into forensics, I use my very same classical science approach. Called to examine a case, my first meeting was with an investigator. Together, we spent many long hours parsing a range of disparate case materials. By the end of the day, his own hand-written pages torn from yellow legal pads were scattered, covering virtually every surface of the room. Plus my own digital notes notwithstanding, time is a limiting factor. *Mise en place*, I arranged my comprehensive report by proportionally organizing it all into a coherent sequential timeline of events within a themed outline. Only then did patterns become readily apparent.

Most recently, my own forensic related project entails a good deal of mapping. Specifically, montaging various distal regions on digital maps. Matching the scaling and directionality are critical to representing the coherent story. Not unlike mapping lengthy dendrites in the central nervous system, using the same imaging methods on another scale.

I have been asked how neuroscience applies to forensic science. It does, and my approach is the same. I use the very same skills as an analytical neuroscientist applied to forensics. Ordering all the factors into a hierarchical scale to solve the messy problem at hand. *Mise en place* serves as a way to mentalize scale, no matter the application.

I am an independent forensic science consultant, a neuroscientist (PhD) and criminal behavioral evidence analyst/profiler (D-ABP) with expertise in bloodstain pattern analysis.

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