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Selective Disregard

Catherine Elgin

Introduction

> A pleasure boat, *The Blue Dolphin*, captained by 35 year old, red haired Maria Bogdan, a native of Brooklyn now living in Dortmund, travels 30 km up the Wibbley River in the same time it takes to travel 50 km down the Wibbley. If the river's current flows at 5km/h, and the water temperature is 12°C, what is the speed of the boat in still water?

We remember such problems from elementary algebra. They are not hard to solve. The first step is to eliminate inessentials. Omit them, disregard them, set them aside. It makes no difference who the captain was, what sort of boat it was, where it was sailing, or what the water temperature was. In fact, it makes no difference that the problem concerns a boat. All that matters is the mathematical relationship that connects the boat's upstream rate, its downstream rate, and the rate of the current.

Abstraction is the first step toward a solution. As the problem is originally posed, relevant and irrelevant facts intermingle. The more details a vignette includes, the harder it is to isolate the relevant elements. When irrelevancies are swept aside, what remains is a representation that highlights the features that bear on the solution. The new, austere representation exemplifies those features, making them epistemically accessible. Mastering algebra involves learning how to set a problem up: that is, how to identify the features of the situation that are relevant, and how to represent them in such a way that their bearing on one another leads to a solution. Abstracting fosters selective disregard.

One mode of abstraction consists in omission (Godfrey-Smith 2009). An abstract representation simply leaves out the features we seek to ignore. A black and white photograph of a tulip garden abstracts from color by restricting itself a grey scale. It does not register color. A verbal description abstracts by describing the tulips as colorful, while remaining silent about what colors they instantiate.

Pretty clearly, some abstractions are products of omission. Locke's discussion may suggest that they all are. An abstract general idea, he says, is one that does not contain the information that its more concrete counterparts include. Because, like the black and white photograph, the abstract general idea of a tulip omits color, there is no danger of being misled into thinking that instantiating a particular color is distinctive of being a tulip. As far as I know, Locke doesn't talk about tulips, but he does talk about triangles. He says that the abstract general idea of a triangle is a representation of a triangle that is 'neither oblique nor rectangle, neither equilateral, equicrual, nor scalene, but all and none of these at once.' (Locke 1984: IV, vii, §9). The abstract idea is a mental image of a triangle, but of no specific sort of a triangle. That is why it can represent triangles in general. Berkeley balks. He has, he insists, no mental image of a triangle that has no specific triangular shape. Nor does he think that anyone else does. Rather, he insists, in reasoning about triangles in general we take any particular triangle we like, and appeal only to features it shares with all other triangles (Berkeley 1957: §10-16). That is, we selectively disregard the features that distinguish one triangle from another.

The dispute between Locke and Berkeley focuses on ideas – private, mental, quasi-pictorial representations. I am concerned with intersubjectively available representations – words, drawings, diagrams, etc. in the public domain. Nevertheless, the same issues arise. If one can form a mental picture of a triangle that has no particular triangular shape, it should be

possible to draw physical picture of a triangle that has no particular triangular shape. Unsurprisingly, I side with Berkeley. If Felix uses an isosceles triangle in his reasoning, but does not invoke anything about the equal sides or equal angles, he could just as well reason with a scalene triangle. The proof would be the same. His proof abstracts from the particularities of the triangle he uses, and because it does, demonstrates something about triangles in general. Nor is this just a point about geometry. When a biologist uses a fruit fly as a model organism, she ignores everything that is specific to that individual insect, and typically ignores everything that is specific to that particular species. The individual, concrete fruit fly functions abstractly because it represents only features that are common to all members of the target class. In cases like these, abstraction is a matter of ignoring the particularities of a particular.

As Berkeley's discussion shows, abstraction is not always a matter of omission. Some constellations of features so tightly intertwine that they cannot be prized apart. Even in these cases, however, selective disregard is possible and often epistemically valuable. It is facilitated by representational choices. Something that looks messy, convoluted, intractable, or irrelevant under one mode of representation may turn out to be orderly, streamlined, manageable, and relevant under another. This is so even when both representations are accurate. The difference lies not in their fidelity to the facts, but in their suitability to the task.

We often deliberately deemphasize, set aside, overshadow, or occlude information. This raises an epistemological question. The motivation for selectively disregarding information via abstraction is not that the information is suspect. We are instructed to disregard the obvious, undisputed shape of the triangle or the obvious, undisputed color of the tulip in order to focus on something more general. But if our goal is to advance understanding, throwing out manifestly reliable information seems unwise.

The Need for Abstraction

Perhaps surprisingly, it is not. William James characterizes the world, as a baby first experiences it, as 'a blooming buzzing confusion' (1890: I p. 488). The raw inputs into the neonatal cognitive system – the stimuli that impinge on the baby's nervous system – are multitudinous, diverse, and disorganized. She has to determine what to ignore, discount, or overlook; what to focus on, attend to, emphasize. The baby needs to learn to discriminate and amalgamate, organizing her experiences into repeatable, identifiable, useful kinds. Once she has done so, she automatically overlooks, disregards or downplays similarities and dissimilarities that do not align with her systems of classification. The process is partly ontogenic. The baby's developing brain naturally coalesces some of its inputs. Environmental factors also play a role; her brain reinforces the synaptic connections among the phonemes that her language contains, pruning the connections among phonemes that her language does not deploy.

This is a start, but it is far from enough to keep confusion at bay. We cannot count on our central nervous system to automatically highlight features that we need to highlight or to block from awareness factors we ought to ignore. We may need or want to override what we are automatically inclined to do. So we devise and revise modes of representation that serve our purposes. Since our purposes are multiple, divergent, and sometimes in tension with one another, our representational resources need to be versatile.

According to James, abstraction is an act of singling out (1890: I, p.505). The process highlights an item, enabling it to stand out from its surroundings. Abstraction demarcates, converting the initially undifferentiated bit of reality into an entity capable of exemplifying relevant features that might, in their natural setting, have been hard to discern.

Exemplification

Exemplification is a mode of reference by which an item refers to some of its own properties via its instantiation of those properties (Goodman 1968, Vermeulen et al. 2009). Examples and samples exemplify. They highlight and emphasize, making features of their objects salient. A fabric swatch exemplifies its pattern, color, texture, and weave. It marginalizes other properties of the cloth – its shape, location, age, and so on. A sample problem worked out in a text book exemplifies a particular reasoning strategy – one that enables students to calculate the area of a parallelogram or divide by a two digit number, perhaps. The sample problem ignores the precise size the parallelogram, focusing only on the factors that generalize to parallelograms as such. We regularly encounter and properly interpret examples and samples, having learned what to attend to and what to disregard.

Any item, no matter how mundane, can function as a sample or example, simply by being treated as such. A tufted titmouse is just a bird – a bit of nature – until an ornithologist points it out. By treating it as an example of its kind, or its color, or its propensity to sing at dawn, or its being smaller than the average house cat, she converts it into a symbol – a telling instance of the feature it exemplifies. Moreover, an item can function as an exemplar of any of its properties, no matter how obvious or obscure that property is. The titmouse can exemplify the range, cadence, frequency, pitch, or timing of its song. It can exemplify its diet, or the way its diet varies with the seasons. It can exemplify the way changes in its diet correlate with its metabolism, and so forth.

An exemplar may be part of a regimented system. The tailor's swatch is part of a commercial system devised to make available fabrics accessible to potential customers. It is cut in such a way that the pattern it displays is representative of the pattern of the fabric. Once we learn how such samples function, we can easily interpret them. We know what features to focus

on and what ones to ignore. Other examples are ad hoc, contrived on the spot for a specific purpose. A driving instructor might point to a passing car as an example of careless driving. With no regimented system in place, greater responsibility falls on the listener's shoulders. Is the lane shift an example of carelessness merely because it is a lane shift, or because it was done without signaling, or because the driver seemed oblivious to oncoming traffic, or what? A priori the question is hard. But in context it may be perfectly obvious what qualifies the maneuver as an example of careless driving.

Not all exemplification is a matter of repurposing ordinary items, elevating them to the status of symbols. Much exemplification in art and science, as well as in commerce, consists in creating items to exemplify particular properties, patterns, or configurations that are not found, or not easily found in the wild. Rather than taking a sample of water from the lake and ignoring impurities, scientists work with distilled water from which the impurities have been eliminated. It is pure H_2O. It is not a representative sample of natural water. But if we construe natural water as a complex of H_2O and impurities, we can treat H_2O as a component of natural water. The distilled water used in the lab then exemplifies properties it shares with natural water. In some scientific contexts, these are the properties that matter. Rather than seeking out a particular tone by listening assiduously to birdcalls, car horns, braying donkeys, and fire alarms, a musician might create a chord in which separate tones interact to exemplify a distinct, audibly complex sound. Like the water used in the lab, the sound in the concert hall is an artifact that exemplifies specific features. Throughout art and science, items are created to exemplify features of interest.

In principle, an exemplar can exemplify any of its properties. A fourth grade teacher might display a student paper, using it as an example of what she wants (or does not want) her students to emulate. She shows, rather than tells, them what she is looking for. She might use it

as an example of appropriate (or inappropriate) length, structure, argument, or topic. She might use it as an example of neat (or sloppy) handwriting, straight (or crooked) margins, proper (or improper) punctuation. She would not treat it as an example of all of these at once. That would swamp the poor students, nearly replicating the baby's blooming buzzing confusion. Instead, she would bring it about that the students ignored some features of the example so as to focus on others.

Exemplification requires instantiation. That might make its scope seem narrow. A blue tile can exemplify 'blue', being an instance of that color. It cannot exemplify 'red' since it is not red. But although the instantiation requirement is a real restriction, exemplification's scope is far from narrow. Every item belongs to indefinitely many extensions and bears a likeness to the other members of each extension it belongs to. Some of these extensions are semantically marked. The bird at the feeder is a titmouse, a tufted titmouse, a songbird, a harbinger of spring, an animal that is not a giraffe, a material object that is noisy, a descendant of dinosaurs, etc..

It also belongs to a vast number of semantically unmarked extensions. Whether or not an extension is semantically marked, a given member can in principle exemplify the feature that all members of that extension share. Usually membership in an unmarked extension is of no interest. If we have no reason to care about the feature shared by the members of the extension consisting of the titmouse, the Milky Way, and a map of the Boston subway system, the opportunity to exemplify that feature is not, and should not be, exercised. But sometimes membership in a semantically unmarked extension is significant. An exemplar can highlight that significance by affording epistemic access to the unmarked property.

International Klein Blue (IKB) is a distinctive, vibrant shade of deep blue. The color was created by artist Yves Klein in collaboration with paint supplier Edouard Adams. It is

exemplified in a series of Klein's monochrome paintings. Klein's exemplars afford epistemic access to a shade that had never before been seen. Initially that shade could only be ostended – '*that* very shade'. It is a shade that, until he baptized it, was semantically unmarked. Still, it could be pointed out and recognized as a color one had never before seen.

Here the newly identified feature is a product of increased refinement of the color palette. In other cases, it is a matter of drawing new boundaries – of recognizing membership in extensions that bridge traditional divides, or that group together things that are typically considered different. This occurs, for example, when we find stylistic affinities that cut across art forms. The category *impressionism* began as a characterization of a style that exemplifies fleeting visual properties. Like International Klein Blue, it was introduced via exemplification. Paintings like *this* qualify as impressionist. The category is broadened when the restriction to the visual is lifted. Works like Debussy's *La Mer* come to qualify as impressionist when the criterion for membership is fleeting sensory properties rather than merely fleeting visual ones. Works like Virginia Woolf's *Mrs. Dalloway* come to qualify when the criterion extends to fleeting emotional properties as well as sensory ones. At each step, the incentive to broaden the category is grounded in the recognition that despite differences in medium, certain works exemplify an aesthetically interesting commonality. They are all instances – telling instances – of fleeting, felt properties.

Cases in which exemplification precedes denotation are common in the sciences as well. A curious phenomenon – something eliciting a 'That's weird!' response – exemplifies something scientists (currently) do not understand. Initially they are confronted with an exemplar of a seemingly unmarked feature. Research is conducted to identify the feature and demarcate its extension. Having discerned that mold on a Petri dish apparently inhibited bacterial growth,

Fleming took it to exemplify something odd and worth investigating. He had no name for the specific sort of mold and no criterion for what other items were relevantly similar. Eventually he identified the mold as penicillin, and recognized that what was exemplified on the Petri dish was the property of being antibiotic. The process that eventuates in a label is not a matter of mere dubbing. It is an empirical inquiry that seeks to find out what sort of thing a phenomenon is, and what other things are relevantly like it. Even if all of the candidate extensions are initially semantically unmarked, the investigation is an effort to discriminate among them and find out which is worth marking out. The investigation is apt to be iterative. A variety of unmarked extensions may be tried out, before the inquirer arrives at the one that groups together all and only the items of interest.

As my examples show, once we have identified and demonstrated the utility of recognizing the similarity among the members of a currently unmarked extension, we can give it a label which becomes part of the lexicon. But the exemplification of a feature often is temporally prior to labeling and may provide reason to think that the label will be useful.

Exemplification makes certain features salient by marginalizing, overshadowing, or occluding others. Often this is easily accomplished. We can readily direct attention to the features of we want to focus on. In a suitable context, an ornithologist can simply point, and thereby get the bird she ostends to exemplify its species. She can say ‘listen!’ and highlight the bird’s song. But in other cases the problem is harder. It is not always easy to ignore at will. If a situation is sufficiently complex or chaotic, it may be difficult to identify or focus on a particular feature. It is not easy to distinguish the subtle flavor of coriander by tasting a mulligatawny soup. Merely being instructed to pay attention to that specific ingredient is not likely to succeed. In cases like this, abstraction is a boon. Taste the spice apart from the soup. Abstract its flavor

from the flavors of the other ingredients. When distractions are diminished, factors of interest stand out.

Exemplification is selective. To focus on some features of an object, to highlight them or bring them to the fore, the exemplar marginalizes or overshadows others. This suggests that exemplification in itself is a mode of abstraction. Because Felix's isosceles right triangle exemplifies triangularity, but not being isosceles or having a right angle or, for that matter, being drawn with a pencil, it serves as an abstract representation of a triangle as such.

Case Studies

Scientific models are abstract representations that highlight certain features of their targets by downplaying or omitting confounding factors. This typically involves idealization as well as abstraction.

> Suppose we have an ecological system composed of foxes and rabbits. There are periodic fluctuations in the population levels of the two species and the explanation turns out to be that the foxes eat the rabbits to such a point that there are too few rabbits left to sustain the fox population, so the foxes begin dying off. After a while this takes the pressure off the rabbits who then begin to multiply again until there is plenty of food for the foxes, who begin to multiply, killing more rabbits, and so forth (Garfinkel 1981, p. 53).

There's nothing special about foxes and rabbits. The dynamic holds for predator/prey population pairs generally. The Lotka-Volterra model represents the dynamic via a pair of differential equations.

$$dx/dt = \alpha x - \beta xy$$

$$dy/dt = \gamma xy - \delta y$$

where

x represents the number of prey

y represents the number of predators

t represents time

αx represents the growth rate of the prey populations

βxy represents the rate of predation

γxy represents the growth rate of the predator population

δy represents the death or emigration rate of predators.

The model involves a number of simplifying assumptions. It assumes that the prey have ample food and that the prey are the predators' only food source. This may or may not be realistic depending on the species pairs and environments in question. It assumes that predators are insatiable and that prey are immortal unless eaten. Neither, of course, is true. But the rationale for incorporating them is that something of significance is revealed if we treat the deviations from the assumptions as negligible. The model also assumes that during the time frame in question there are no significant environmental changes; nor is there significant genetic drift. The model simply sets these contingencies aside, and implicitly acknowledges that it is inapplicable when they obtain. Insofar as many of these assumptions are strictly false, one might wonder why we should think the model has any scientific value. Why isn't it a bit of science fiction? The answer is that that the assumptions are felicitously false. They are falsehoods that reveal something worth noting. When a divergence from truth is negligible, it is permissible to substitute a felicitous falsehood instead; when the divergence is fruitful, it is desirable to do so[1]

1 Something is negligible if it can permissibly be neglected. That depends on its function in the context in which it is used. A slight divergence may be non-negligible if it makes a big difference; a large divergence may be negligible if its distance from the truth does not matter. This is why it is possible to treat a gas giant like Jupiter as a point mass.

(see Elgin 2017). In an environment where foxes overwhelmingly feed on rabbits, and the vast majority of rabbit die by being killed by foxes, it is at least presumptively reasonable to ignore the exceptions, particularly if the exceptions seem to be scattered, and do not lend themselves to a systematic account. The exceptions can be dismissed as noise. The Lotka-Volterra equations exemplify the resulting pattern.

The model is silent about mechanisms. It indicates nothing about how the populations modulate their sizes. This may seem surprising. If a population modulates its size in response to certain pressures, one might think, we should want to know how it does so. No doubt we do. But it does not follow that because the model prescinds from mechanisms it is defective or that the understanding it yields is regrettably incomplete. For the omission enables it to be quite general. The model reveals a pattern that holds across species with radically different reproductive systems: fish in the Adriatic, starfish and mollusks, foxes and rabbits, even loan sharks and needy borrowers. However it is that starfish modulate their reproduction in the face of mollusk scarcity, it is not the same way that foxes do when the rabbit population diminishes. Indifference to mechanism then enables the Lotka-Volterra model to exemplify a broad pattern, and thus to exemplify the surprising fact that for certain purposes, at a given level of abstraction, the mechanisms don't matter.

Because it is remarkable that wildly divergent population pairs display the same pattern, the model itself becomes an object of scientific study. Representing at this particular level of abstraction, sidelining specific confounding factors, connecting the data points into particular curves reveals something interesting. The pattern is projectible. It is not just a summary of previously examined cases. It affords reason to expect that other predator/prey population pairs will display the same dynamic. It is thus more informative than the individual instances taken

separately or even conjointly (see Ambrosio forthcoming). So the question arises: why does abstracting from the blooming buzzing confusion in just this way yield an understanding of the phenomena? Why are these particular simplifications and idealizations fruitful (see Cristalli and Pietarinen 2021)?

Let us turn now to a case drawn from art. IKB79 is a monochromatic painting by Yves Klein. The canvas is covered in IKB paint, the distinctive, vibrant shade of blue that Klein and Adams created. It is then entirely a patch of blue. This might suggest that it is no different from the samples that commercial paint companies distribute to advertise their wares. Like commercial paint samples, it exemplifies a particular shade of blue, thereby affording epistemic access to that shade. Even under this description, the painting would be of interest, since it exemplifies a color its audience has not previously encountered. But to stop there would fail to do the work justice. The experience of IKB is uncanny. The color seems to float above the canvas, not to inhere in it. The experience is rather like that of staring up at a cloudless sky. There too we have a perception as of a color that does not inhere in a material object. Through the analogy with the sky, we can appreciate that the painting exemplifies the boundless, the intangible, the immaterial, maybe the sublime. The painting exemplifies absence – the void. But the void is not exemplified as ominous. What it portends is an open question. This leads us to consider what sort of absence is exemplified. Is it an absence of obstacles or of opportunities? Is the void only lacking in particular, bounded material objects, properties and relations? Or is it also lacking in hopes, dreams, feelings and aspirations?

Abstract art is often characterized as non-figurative. Abstract works do not even purport to denote. This makes the characterization of a particular work parasitic on a metaphysics which determines what is there to be denoted. One might wonder then whether IKB79 is a work of

abstract art. Might it be a figurative painting denoting a cloudless sky? Might it be a figurative painting realistically depicting something – perhaps absence – that is itself abstract? For our purposes, it does not matter whether the painting qualifies as *abstract art*. What is important is that it abstracts. It sidelines irrelevancies (e.g., about material objects) to highlight immaterial factors. It affords resources for distinguishing the experience of color from the experience of something colored. It exemplifies boundlessness, absence, and the perils and promises that absences provide. It effects a reorientation toward the world and our place in it.

A Worry

My discussion may make it plausible that abstraction in art and science is a matter of singling items out for attention, as James said. But I suggested that exemplification is the vehicle for abstraction. This seems problematic, since exemplification requires instantiation. Is it the case that the abstract exemplars instantiate the features of their targets that they purport to afford epistemic access to?

In one respect, success is guaranteed, at least if we restrict the target enough. There is no danger of failure of reference, because the exemplar itself instantiates whatever it exemplifies. The Lotka-Volterra model exemplifies a pair of differential equations. IKB79 exemplifies its own shade of blue. But I have claimed something more, and perhaps more doubtful. I said that the Lotka-Volterra model exemplifies the pattern of interdependence of predator and prey populations and that IKB79 exemplifies boundlessness.

One worry about the model can be set aside. Some might object that since mathematical relations are abstract and regularities pertaining to predation are concrete, the two cannot share properties. I do not see why. A pattern can have both material and immaterial instances. When

Joe says, ‘each person has only one birthday’ and ‘only one even number is prime’, the word ‘one’ is univocal.

The real concern is that the pattern displayed by the foxes and rabbits is not quite the one captured in the model’s equations. I allowed for the exceptions by construing them as noise. The model, by affording epistemic access to a pattern that is displayed when the noise is ignored, highlights an important aspect of what occurs in the noisy environment. Still, calling the exceptions noise might seem like sweeping the problem under the rug. But taken jointly, many of the foxes and rabbits instantiate the pattern, even though the pattern is overlaid by a few readily ignorable confounds. The model affords access to an unmarked or not easily marked extension. The preponderance of cases instantiate the pattern even though we lack a term to mark out just those cases.

There is a plethora of semantically unmarked properties. They are capable of being exemplified, even if we have no word to denote the extensions they constitute. It seems straightforward to interpret IKB as exemplifying a previously unmarked shade of blue and perhaps a previously unmarked experience of boundlessness. Klein’s first example of IKB appeared before the color had a name. That being so, there seems to be no principled objection to interpreting IKB79 as exemplifying additional unmarked properties – one, a distinctive sort of absence; another, a hitherto unnoticed similarity to the boundlessness of the sky.

Some unmarked properties are higher-order properties. Maxwell’s model of the ether instantiates and exemplifies a previously unrecognized higher-order structure shared by the electromagnetic and the mechanical realms. A Rothko painting consists of swaths of color instantiating and exemplifying a higher-order property, neither visual nor emotional, that it

shares with a distinctive feeling of melancholy. The painting connects the visual and the emotional realms by visually displaying how that emotion feels.

The abundance of extensions provides opportunities to reorder things – to mark out new individuals, kinds, patterns, and relations as worthy of attention. Through abstraction we distance ourselves from mundane ways of thinking, representing, and acting that blind us to alternatives. Abstraction enables us to entertain new modes of organization, to test them out to see if they contribute to an advancement of understanding. We can exemplify at a finer-grain or a coarser-grain than is typical and see what results. We can forge connections across conceptual divides using the shared instantiation of higher-order predicates to demarcate commonalities that bridge standard categorial divides.

Are All Symbols Abstract?

Inasmuch as omission is a type of abstraction, it seems to follow that all representations are abstract. Not only does the Lotka-Volterra model present an abstraction of predator/prey relations, so does a picture of a lion stalking a gazelle. Not only does a Rothko present an abstraction of melancholy, so does Munch's depiction of a sad young man. This is true. Every representation omits something. To capture the difference between ordinary omissions and the more extreme ones we are apt to call abstractions, it pays to look again at exemplification. I suggest that the representations we call abstract omit or occlude standardly salient features in order to exemplify features that are not ordinarily salient. Which features are standardly salient is a function of our representational practices. Melancholy is a mental state. We therefore expect a picture that expresses melancholy to be a picture of someone who is manifestly sad, despondent, downhearted. That's what Munch's *Melancholy* is. We might even think that it would be impossible to pictorially convey melancholy without representing a melancholic figure.

Rothko disagrees. He abstracts further: he leaves the sufferer of melancholy out. His subject is melancholy, not a melancholic person. He presents a colored surface that expresses the mood. It exemplifies the feeling without depicting a person who has that feeling. Predation is a relation between animals. We expect a representation of predation depict predators and prey. The Lotka-Volterra model abstracts. It leaves out the animals and just presents a dynamic mathematical relation that is characteristic of certain population pairs. In both cases, the abstractions pay dividends. By failing to provide the resources for a mundane way of looking at things, they enable us to see what we would otherwise miss.

Conclusion

Abstraction is ubiquitous. Every representation, no matter how detailed, standardized, or regimented, omits some features of its target. Every representation emphasizes some features, while obscuring, occluding, or downplaying others. In so-called 'realistic' representations, the mode of representation is self-effacing. Realistic representations deliver their content straightforwardly. Audiences ordinarily know how to interpret them and what they convey. The information itself may, of course, be surprising. But it is typically no surprise that this particular sort of symbol conveys this particular sort of information. The picture of a cat on a can of cat food looks the way we expect a depicted cat to look.

So called 'abstract' symbols are different. Non-figurative works in the visual arts, and mathematical representations in the sciences exemplify features without representing the material objects in which these features normally inhere. They dissociate the feature from its material instantiations thereby affording epistemic access to the feature itself. One might think that such distancing always moves from the more specific to the more general. We saw in Berkeley's discussion of the triangle how abstraction can promote generalization. But this is not always the

case. The emotion a Rothko expresses, the shade of blue a Klein exemplifies, the magnitude an equation conveys may be extraordinarily fine-grained. Indeed, it may be so fine-grained that it cannot be put into words. Abstraction is an avenue to epistemic access because it pulls us away from the familiar, prompting us to look more deeply, and pointing in a direction in which it might be fruitful to look.

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