

Commentary 1: Faith, Hope, and Love

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Crossing Over

As a young man, fearing to be drawn in completely by the siren song of numbers, sets, theorems, and lemmas, the author of the present book fled his mathematical and physical studies to seek refuge in the faraway land of psychology. He didn't entirely shed his attire, though; today you still ask him about number theory at your peril.

Cross-dressing—entering one field of science clad in the apparel of another—has been a known way to score points with the natives and gain professional success. In psychology, mostly frequented by softheads, hardheads from mathematics have had a particularly easy time. Who dare call out the Emperor or question what they don't understand? This partly explains why the curriculum is stocked with mathematical methodology students are expected to learn and why our official history pivots around mathematical discoveries. Thus G.T. Fechner, a physics professor, is said to have launched modern scientific psychology by subjecting sensory experience to logarithmic scales; George A. Miller is credited with inaugurating the current triumphant line of cognitive psychology with his magical number seven plus minus two; and it was when Daniel Kahneman discovered that *Homo economicus* has calculating deficiencies that psychology received its first Nobel Prize.

All the cheering notwithstanding, the importance of mathematics in psychology has been exaggerated. You certainly don't want to belittle achievements like signal

detection theory, information theory, and game theory, but their virtues untold, such theories at best touch the periphery of the psychological domain, and when the heartland is reached for, usually result in reduction, if not plain distortion. Truth be told, with the proverbial exceptions to prove it—factor analysis, perhaps—it seems to have been the rule that the crossing of psychology and mathematics has contributed little to the first and less to the second.

The present work breaks that rule. Jens Mammen is not a mere cross-dresser; he is a true trans, and his work throws great light upon both psychology and mathematics. That is what makes this work so highly original and extraordinary.

Speaking Prose

What people are most likely to remember from Molière's comedies is Monsieur Jourdain's exclamation when to his surprise and delight he is told that he is speaking prose: "My God! Then I've been speaking prose all my life without even knowing it!" However risible we think Monsieur Jourdain, speaking prose is what Mammen's work is all about. It is the theme that clicks together psychology and mathematics. The basic plot is this.

Until Ernst Zermelo in 1904 put forward his axiom of choice, mathematicians had no idea that they were speaking prose. When told, they were surprised and critical; and if eventually prose was accepted, it took a while, and the odd one out still balks. Speaking-prose-neglect is found among psychologists too; only in their case, the cause is not ignorance but partly overfamiliarity, partly dogma. Like the fish is last to discover the water in which it swims, prose comes so natural to psychologists that they rarely give it a thought, and this thoughtlessness is certainly not challenged by the prose-averse Galilean science from which mainstream psychology has taken its cue. Ordinary language is unfit for science, said Galileo; science must be "written in the language of mathematics ... without which it is humanly impossible to understand a single word ... [and] one is wandering about in a dark labyrinth."¹

Prose is the flow of ordinary language, structured around the subject-object relation, and the subject-object relation is the soul of psychology. Disbanding prose, Galilean science disbanded the subject-object relation defining of the previous Aristotelian psychology. Galileo was the leading light in Abbé Mersenne's illustrious seventeenth-century circle of mathematical prodigies and pioneering physical experimentalists, and Thomas Hobbes, a member, was first to draw the conclusion, reject the Aristotelian psychology, and turn the human being into a mechanical machine. Upon which, seeing the problem, René Descartes, another member, tried to put the soul back into the machine; upon which, seeing the problem, Baruch Spinoza, a student of his, simply fused machine and soul into panpsychic unity; upon which, seeing the problem, Hobbes' British compatriots recommended concentrating on subjective experience and leaving aside the material object; upon

¹Galileo (1623), p. 4.

which, seeing the problem, Immanuel Kant, etc. On and on it went through centuries of philosophy and thinking, and it's still going on.

Into the fray enters Mammen as any serious student of psychology should. In the book, his lifelong campaign against the dragons that keep Lady Psychology captive is both vividly and lucidly narrated. Two things are highly noticeable from his account:

Firstly, that while there seemingly are two—very different—antagonists, suffocating mechanical physics at one end and huffing and puffing phenomenology and hermeneutics at the other, they are really the two heads of one and the same monster, a poor beast suffering from an unfortunate disturbance of the subject and object connection.

Secondly, that Saint George has a most unexpected lance to wield: the axiom of choice!

Axiom of Choice

The axiom of choice basically states that if there is food in the fridge, you can get it without specifying it first; you just open and grab. As this seems obvious, why not to mathematicians? The reason was that to mathematicians it was the specification that brought an object into being; without specification, there could be no object; object and rule-bound specification were simply the same. Trying to be helpful, Bertrand Russell explained that prior to the axiom, you could pick a shoe from a closet full of shoes, but not a sock from a drawer full of socks, because the shoe could be specified as a left or right, and the sock could not. After the introduction of the axiom, however, you could get the unspecified sock also.

Still those socks created some anxiety with the mathematicians. “It is not altogether uncontroversial that the axiom of choice should be accepted as something that is universally valid,” wrote the renowned physicist Roger Penrose. “The trouble with this axiom is that it is a pure ‘existence’ assertion, without any hint of a rule.”² Penrose’s statement brings us right to the heart of the matter: rule or existence?

Rule in our context is synonymous with specification and description, and this again is the same as appearance or phenomenon. In other words, mathematicians originally shared the conviction of the subjective idealist philosophers in Britain, who held—in the words of George Berkeley—that *esse est percipi*, that being is appearance.³ If we here mention that the land of psychology, in which our fugitive author was seeking asylum, was ruled by a rigid school of phenomenology led by a professor, who took George Berkeley as his model; that the first string of theoretical papers Mammen wrote were directed against this professor and the narrow subjectivism of that school; and that this criticism went to the barricades in a 1968 student

²Penrose (2004), p. 366.

³Not that strange since mathematical objects, like circles and triangles, are best thought of as ideal Platonic forms without material substance.

rebellion of which Mammen was an organizer, then this obviously goes a long way to explain his alertness to the heterodox and heretical mathematical axiom that claims that *existence matters* and *appearance is not everything*.

A dictionary tells us that “phenomenal” means cognizable by the senses, whereas “existential” means having being in time and space, and with this pair we have reached the duality that runs like a red thread through Mammen’s work. *Sense categories* and *choice categories*, he calls them, the first referring to sensory appearance and the latter to the axiom of choice with its existence claim.

The distinction between sensory appearance (*aka* qualitative identity) and existence as temporal-spatial being (*aka* numerical identity) is—like speaking prose—not something to which we usually pay attention. Those familiar with detective series will be well aware, however, that identification is not grabbing, nor grabbing identification; a culprit on a police file and a culprit in custody are two quite different things; you can have the one without the other.

With the axiom of choice, grabbing is introduced in mathematics. As Mammen perceptively notes, it was always there through the backdoor—take a circle, said the teacher from the blackboard to the class—but until the axiom of choice, never through the front door. Grabbing is a subject-object relation, which means that with the axiom, psychology enters mathematics in a formal and axiomatic way. If, however, the axiom of choice is the ingress of psychology in mathematics, it is also the ingress of mathematics in psychology. There was never before a gathering like this, and Mammen’s claim to have introduced a new logic is completely justified. If there be reason and justice in the world, its future impact should at least equal Fechner’s psychophysics a century and a half ago.

In the book, playing both fields, Mammen elaborates and develops both what the new logic means for mathematics, and what it means for psychology. I shall leave the first for the hardheads to savor and, in this commentary, keep to psychological issues we have both shared.

Beginning with the Beginning

Having first met when he was external examiner on my PhD thesis on human evolution and human exceptionality,⁴ my work dovetailed with Mammen’s, when, reading his doctoral dissertation⁵, I became convinced that his category of choice fitted the idea I was working on, namely, how the psyche—the subject-object relation—came into the material world in the first place.⁶ Years of friendship and cooperation followed,⁷ and the above idea—to link intentionality with thermodynamics via the living being’s locomotion through time and space in quest of food—has been

⁴Engelsted (1984).

⁵Mammen (1983).

⁶Engelsted (1989).

⁷Mammen, Engelsted, & et al. (2000).

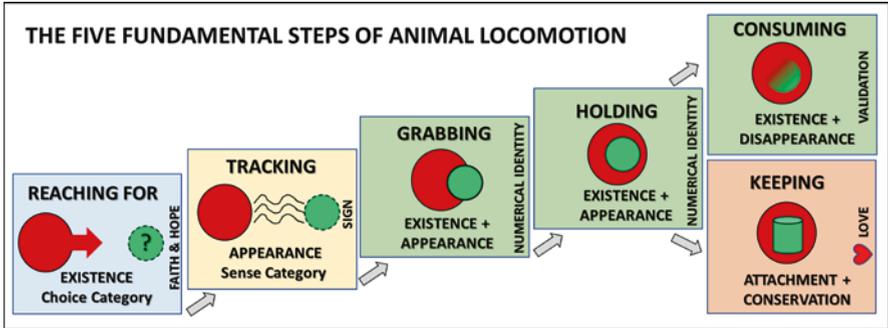


Fig. 1 The five fundamental steps of animal locomotion

included in the present work, where Mammen very aptly calls it the symmetry breach that saves psychology and the world from panpsychism. The threat of panpsychism must be averted, of course, when Mammen, in another of the book’s important contributions, lectures us that the notion of physics habitually entertained by psychologists is grossly antiquated, and that modern physics in its portfolio has long had a full range of phenomena traditionally—and falsely—reserved only to life and psyche, spontaneity, active selection, and discontinuity among them.

The primordial subject-object sequence mentioned is the easiest entrance to some of the intricacies and challenges contained in Mammen’s work. The sequence, valid from amoebas to human shoppers, has—as seen in Fig. 1—five steps, the last of which has two options.

First the subject sets out into the blue in search of its object, food in the case of amoebas, merchandise in the case of shoppers. Next, with luck, informative traces are picked up to guide the subject toward the object. When tangible contact is reached, the subject tries to grab and hold on to the object. Finally, the object is either consumed, always with amoebas, or safekept, with humans also a possibility.

If you have grown tired of *mind and behavior* and want another short definition of what psychology is about, *faith, hope, and love* would not be the worst choice, which justifies this commentary’s title. More to the point, the three concepts are also highly pertinent to the issues at hand, which explain their reappearance in the figure. Mammen practically makes *love* the defining subject matter of human psychology. Comparing humanism and psychology to Goethe’s Doctor Faustus and his deploring fate of “eternal emptiness,” the rescue is also the same, says Mammen, namely, “*love*, or a hitherto ignored *structure* in the world, and in human existence, with love as a paradigmatic example.” To explain that is—besides to present the new mathematics—the aim of his book, he says.⁸ Before we turn to love, however, we shall begin with faith and hope.

Long before faith and hope became the mental concepts we today think them to be, they were operationally defined by behavior. By moving out, the amoeba essentially

⁸This book, page 17.

makes two statements. First, a profession of *faith*: “There will be food objects out there.” (The nonempty set in *Zermelo’s Axiom of Choice*.) Secondly, a declaration of *hope*: “I’ll get one.” (The non-specified element that *Zermelo’s Axiom of Choice* will let you pick.) The behavior defines the object as something reachable by locomotion and therefore something with time-space coordinates; this is *existence*. (The existence assertion of the axiom of choice.) Even if the time-space coordinates are yet unknown and not specified, this qualifies as *numerical identity*. This in pure form is Mammen’s *choice category*. It is also the first instance of *intentionality*, the *aboutness* that psychology is about in Franz Brentano’s classical definition.

Mammen’s *sense category* makes its entry in the figure when the active animal is guided—or, if passive, goaded—by an array of incoming sensory stimulation. Since the sensory display in itself would satisfy an—in principle endless—array of objects, rather than point to a particular object in the temporal-spatial matrix, it is called *qualitative identity* and distinguished from *numerical identity*. The theoretical foundation of stimulus-response psychology lies with qualitative identity and the sense category. Basically, it is placing the cart before the horse.⁹

In the third stage, where the food object has come within reach, and—as vividly depicted by Herbert Spencer Jennings in Fig. 2—the amoeba starts grabbing for it, the choice and sense categories meet up, an intersection which is itself a choice category. (Axiom 11 in Mammen’s topology.)

Faith and hope done, now let’s turn to love at the other end of the sequence.

Love Is a Many-Splendored Thing

The two pillars of Mammen’s work are *the human sense* and *the mathematical topology* in which it can be formalized. *The human sense*, the title of the 1983 dissertation where it was first laid out, is a sense of numerical identity, particularity, and particular attachment unique for the human being. Love, as we saw, is now made the paradigmatic example of this “special structure in the world,” but it spreads its threads into the human world in a cascade of variations. Mammen mentions friendship and solidarity, parental love and bonds, family ties and obligations, interests and affections, sentimental value and *perezhivanie* (lived emotional experience), freedom and biography, personal belongings and private property, gifts and souvenirs, and history and cultural context; even science has its root here, why the human sense is also the “scientific sense.”¹⁰ In short, the whole portfolio without which “humans would not be humans.”¹¹

How much of this is truly human, we may ask? Particular attachments are not completely unknown in the animal world. Prairie voles and barn owls pair for life;

⁹Observe, however, that few psychological theories actually make that mistake; even theories of behaviorism usually get the horse placed right, Skinner’s *operant* behaviorism, for instance.

¹⁰This book, p. 42.

¹¹This book, p.40.

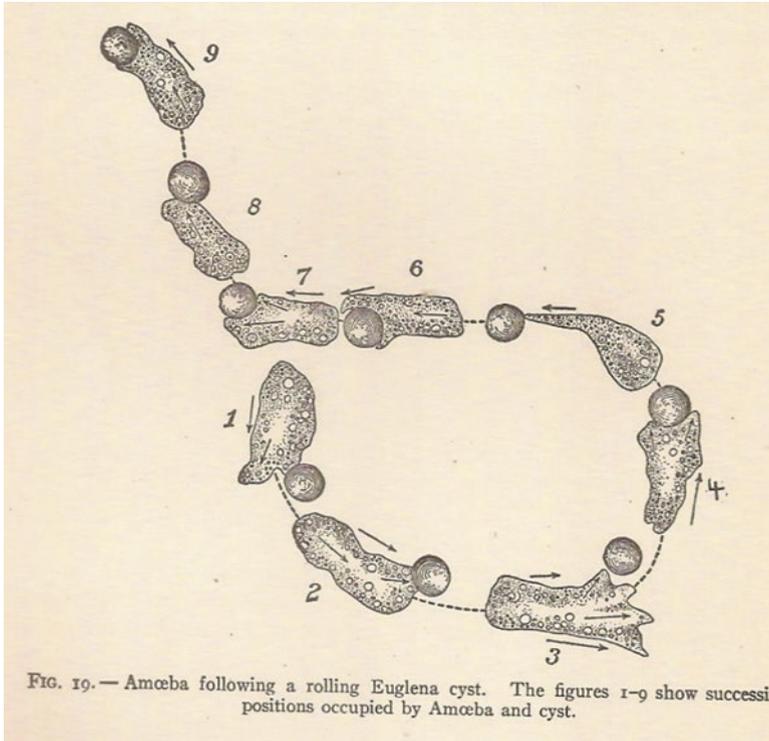


Fig. 2 Chasing amoeba. Herbert Spencer Jennings, *Behavior of the Lower Organisms*, New York, Columbia University Press, 1906

chimpanzee mothers mourn and refuse to let go of their dead babies; killer whales form friendships for life; dogs recognize again their long-gone owners and can become perversely attached to particular toys; elephants remember people and past events like elephants, and so on. In other words, the animal world seems as full of love, attachment, and keeping track—and score—as the human world. Is Mammen defrauding animals of valid attributes to prove our human exclusivity? I think not, but the question is not irrelevant.

Nearly everyone on human record who has tried to home in on the specific human difference has been guilty of this self-serving stratagem, myself included. Arguably, Mammen was guilty too in his 1983 dissertation. While solely dealing with the human being and the human sense of particularity, and animals, when mentioned at all, merely served as a backdrop for our human exclusiveness, basically this clear and simple cut was made: humans have choice categorical access to the world, and animals have only sense categorical.¹²

¹²Note that without this clear-cut oversimplification, Mammen would probably not have made his discovery in the first place, which makes it another example of how errors pave the way of scientific progress.

If Mammen in his dissertation was sparing toward the animals, in the present book, however, this stinginess has been redressed in spades. Not only has *the animal world* been licensed to make choice categorical choices, *the inanimate world* has as well! With this radical largesse—*The Full Monty*, Mammen has called it after a 1997 British comedy drama¹³—two problems follow.

First, to avert panpsychism: how did the animal world emerge from the inanimate world? Secondly, to maintain human uniqueness: how did the human world emerge from the animal world? The already mentioned breach of symmetry provides the answer to the first question. About the second, Mammen says that “questions of the concrete and detailed emergence of ‘the human sense’ as a specific elaborated form of the duality already found in animals’ life are not central. What is central is that after the introduction of the specific human duality in relations to the world of objects, a new structure is found in these relations.”¹⁴ In his examination of this after-the-fact structural reality, Mammen in the dissertation followed Karl Marx’s astute analyses of the transformation of nature by concrete practical work and tool use and in the present book seems satisfied to stick with that: “A fundamental difference between the duality in *animals’* and *humans’* relations to objects was that the *sensory* relation in humans to objects’ qualities or *features* was supported and framed by tools and particulars beyond the ‘naked’ senses shared with animals.”¹⁵

And why not? Not only Karl Marx, but up through the ages, Enlightenment icons like Benjamin Franklin have defined us as *a tool-making animal*, and up till this day, paleoanthropologists like Kenneth Oakley have named us *Man the tool-maker*. It is simply the time-tested standard story of human evolution; it is evidence based, too, and cannot be wrong. And neither can the tool-based and love-bonded duality-reality of the human being, Mammen describes so well.

Still I believe that the question of emergence *is* central and has elsewhere argued that tool use, amply present in the animal kingdom, *itself*, is not enough to tip the animal into the human being.¹⁶ A twist is needed, a Monsieur Jourdain twist, in fact. Whether right or wrong in this, pursuing such a twist will sharpen the understanding of Mammen’s discovery, and he has himself eased our path by coming up with the splendid concept of double-entry bookkeeping.

Double-Entry Bookkeeping

Now, if you would care to look again at Fig. 2, I trust you will agree that the amoeba chasing and trying to grab hold of the food object is engaging a thing with numerical identity and a trajectory in time and space. In other words, the amoeba’s action is all

¹³“The full MONTI. Preliminary answer to Niels Engelsted,” in Mammen, Engelsted, and et al., (2000), p. 327.

¹⁴This book, p. 43.

¹⁵This book, p. 55.

¹⁶Engelsted (2017).

about grappling with particularity, and—by extension—that animals not just address sensory information, but address particularity as well. And, remember, when they address both, they speak particularity—Mammen’s Axiom 11. If they didn’t, they simply couldn’t be the grabbing creatures, they are. But if animals know particularity intimately, *they don’t know, they know*. Like Monsieur Jourdain who spoke prose fluently, but did not know, the animals speak particularity fluently, but do not know. They remain enclosed in their animal state of innocence. Translated into Latin, knowing to know is *consciousness*, and consciousness has been considered the human prerogative long before Linnaeus named us *Homo sapiens* and filled our slot in his *Systema Naturae* with the admonition, *Know Thyself!* Even if human consciousness—and not least human language, its twin and walker—has invoked some rather idealistic and mystical non-explanations, rightfully criticized by Mammen in the book, this should tell us that we are on the right track.

If, for a moment, we stay with language, its sentences can be parsed as *subject-object* relations, but also as *subject-predicate* compounds. In the latter, “a factual statement first identifies something it is ‘about’, and then adds what to say about it,” as Mammen explains.¹⁷ Which, of course, means that the subject-predicate compound is ideally suited to express the *duality* between an object’s choice categorical existence and its sense categorical appearance. The amoeba speaks in subject-predicate compounds when it chases the food object, compounds of existence and appearance, but as it cannot separate the two, it cannot know it speaks particularity. Animals “are simply not prepared for it,” Mammen writes, as they have not yet “established the human ‘double-entry bookkeeping’.”¹⁸ “It is evident,” he continues, “that if this *duality* of subject and predicate can’t be held *separate* and then again *combined*, factual statements would be impossible.”¹⁹ This operation—*from whole to split to whole again*, now knowing the old in a completely new way—is double-entry bookkeeping, and what Mammen here says of language could be equally said of human consciousness; it is simply the human sense that makes us the unique animal in the animal kingdom.

It is heavy stuff, agreed, so let’s summon up some foreign help and look at it from another angle.

The Hammerhead Falling Off

Mammen’s work could rightfully be called *the topology of being*, and this is precisely what Martin Heidegger has called his own thinking.²⁰ Like Mammen, Heidegger was critical of the reign in philosophy and science of the universal, the global, and

¹⁷This book, p. 46.

¹⁸Ibid.

¹⁹Ibid.

²⁰“Topologie des Seyns” in Heidegger, M.: *Gesamtausgabe 15*, Frankfurt: Vittorio Klostermann, 1986, p. 344.

the abstract to the neglect of the particular, the local, and the concrete. Like Mammen, Heidegger was concerned with the time and space of lived experience, and how it ties us into our familiar world with threads of local history and personal biography, with bonds of practical artifacts and sentimental keepsakes. Both also share an understanding of the truly human “conservatism” in “traditional values” and “in peoples’ relations of love, solidarity, friendship, faithfulness, owning, belonging, and reverence.”²¹ Finally, to catch this human reality, they have both introduced new elaborate codes, mathematical ciphers in Mammen’s case, verbal in Heidegger’s. It is to a string of the latter we now turn for supplementary elucidation.

With fingers in flight over the piano keyboard, music is flow, only when a note jarringly fails, it becomes score, and what was *Inhanden-sein* (ready-at-hand) becomes *Vorhanden-sein* (present-at-hand). The terms are Heidegger’s, not the example. Heidegger’s own signature example is the flow of hammering and the upset when the hammerhead breaks off. Basically, it is the flow of praxis turning into the stuttering scrutiny of theory, existence into rule and description, and a split in the subject-predicate compound Mammen was talking about.

The problem with most philosophy and science in Heidegger’s diagnosis has been that it has got stuck in the *Vorhanden-sein* mode, forgetting whence it came; or, as once said by Madame de Staël, that it “can only examine by division, [and] applies like a dissecting knife to dead nature, but . . . is a bad instrument to teach us to understand what is living.”²² But if Heidegger harbored a nostalgic yearning to regain the primordial flow of innocence—and I don’t know enough to say that he did—becoming a child again is obviously impossible. When praxis turns into theory, it cannot turn back again except as practice of theory, or theory of practice; for instance, as a book like Heidegger’s *Being and Time* about the primacy of the flow of praxis.

I believe this is Mammen’s point. Once the whole has been split into existence and appearance, humans are fated with a knowledge amoebas don’t have; further, humans can now use this double-entry bookkeeping to keep apart the sides in time and thereby learn the secrets of unfolding nature, as Mendel did with his peas in Mammen’s favorite example of how the human sense became also the scientific sense.

Heidegger’s subject is being. There are two kinds. *Vorhanden-sein* delivers the world as *Seiendes*, the things and objects of trade and science. *Inhanden-sein* delivers the world as *Sein*, the lived experience of living beings. Animals have lived experience too. In a famous essay, Thomas Nagel said it must be like something to be a bat, and of course it must. Shared by cats and gnats and our little friend, the amoeba, the *Sein*, or way of being, Heidegger talks about, is not a human prerogative. *What is, is our*

²¹ I hasten to add that Mammen—contrary to Heidegger—also sternly warns against the other side of this coin: “its *perversions* in hate, prejudices and xenophobia, chauvinism and expressions of supremacy, false generalizations, racism, discrimination, and exclusion.” This book, p. 54.

²² Madame de Staël, (1814)/Le Van Baumer (1978), p. 475.

ability to discover it. Meriting a special name, Heidegger called it *Dasein* and defined it as “that entity which in its Being has this very Being as an issue.”²³

Though, admittedly, I’ll never make a living as cryptographer, it seems obvious to me that the reflective circularity in that little string of code refers to the human prerogative of knowing to know talked about above. Mammen’s human sense and Heidegger’s *Dasein* are in my view, if not twins, then at least family, working in parallel in the same field.²⁴

Into Other Chapters and Different Translations

Heidegger’s preoccupation with tool use, and the hammerhead falling off as the Monsieur Jourdain moment that makes *Dasein* stand out, fits well with Mammen’s views on the emergence of the human sense. I believe, however, as said above, that a different Monsieur Jourdain moment had to arrive first to make it all work, and that the split in the subject-predicate compound had to be preceded by a split in the subject-object relation.

Ripping a different page from the chapters of Karl Marx, I have argued that, rather than *work* and working with tools, its immense importance untold, it was *labor* that was the decisive catalyst in the emergence of the human being. In labor, the subject is dispossessed of its object, and from Hegel on, this split—with subsequent alienation—has been thought the root of human consciousness. As I have further suggested that this object transfer—in a fall from animal innocence through an Adam-and-Eve-like event—originated from prehuman mothers’ unselfish feeding of their young,²⁵ Mammen and I have simply ended up in two different translations of Paulus’ famous letter to the Corinthians. He in the modern version’s faith, hope, and *love*, but the greatest of these is love. Me in old King James’ faith, hope, and *charity*, but the greatest of these is charity. And while love is mostly sentiment, it can at least be said of charity—Paulus’ *agape*—that it captures the contours of concrete activity.

Such little things are important to those involved, of course, but whether work or labor was first, love or charity greatest, soon enough they were all there, contributing to the human world, unique in precisely the way so richly described and astutely x-rayed in Mammen’s work.

²³ Heidegger (1927/1962), p.68.

²⁴ Compare, for instance, the following quote with Mammen’s category of sense and its inability to capture choice categorical existence: “The senses do not enable us to cognize any entity in its Being; they merely serve to announce the ways in which ‘external’ Things within-the-world are useful or harmful for human creatures encumbered with bodies...they tell us nothing about entities in their Being.” *Being and Time*, 1927/1962.

²⁵ Engelsted (2017), pp. 89–102.

The Final Word

Mathematics can say things with its sets and numbers that are beyond the words of ordinary language, in this Galileo was right. But words are not just mumbo jumbo and wandering in dark labyrinths; human language with its subject-object relations and subject-predicate compounds is the vehicle of human consciousness, and words can unfold worlds of life and beauty and depth quite different from the magic runes of mathematical formula. Had that not been the case, there could have been neither poetry, literature, *nor psychology*.

Now Mammen is leading the hardheads deep into this, our happy vale. Should we, the softheads, cry out in trepidation and alarm: *Enemy at the gates!* We should not. While resentment and regret would be the natural first reaction, upon further reflection, the invasion should be greeted as a welcome and long-awaited advancement. Not only can the hardheads now—as once the Mongols in China—at long last be introduced to these most important and tender matters, hitherto beyond their grasp, the delicate matters themselves can be sharply presented in new and enlightening exhibition cases. Lastly, and perhaps best of all, we psychologists can now have a hope, to finally gain the long-wanted respect and respectability that mathematics always bestows on a scientific field.

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