Noesis

The Journal of the Mega Society

Issue #187 August 2008

Contents

About the Mega Society

The Mega Society was founded by Dr. Ronald K. Hoeflin in 1982. The 606 Society (6 in 10^6), founded by Christopher Harding, was incorporated into the new society and those with IQ scores on the Langdon Adult Intelligence Test (LAIT) of 173 or more were also invited to join. (The LAIT qualifying score was subsequently raised to 175; official scoring of the LAIT terminated at the end of 1993, after the test was compromised). A number of different tests were accepted by 606 and during the first few years of Mega's existence. Later, the LAIT and Dr. Hoeflin's Mega Test became the sole official entrance tests, by vote of the membership. Later, Dr. Hoeflin's Titan Test was added. (The Mega was also compromised, so scores after 1994 are currently not accepted; the Mega and Titan cutoff is now 43—but either the LAIT cutoff or the cutoff on Dr. Hoeflin's tests will need to be changed, as they are not equivalent.)

Mega publishes this irregularly-timed journal. The society also has a (low-traffic) members-only e-mail list. Mega members, please contact the Editor to be added to the list.

For more background on Mega, please refer to Darryl Miyaguchi's "A Short (and Bloody) History of the High-IQ Societies,"

http://www.eskimo.com/~miyaguch/history.html

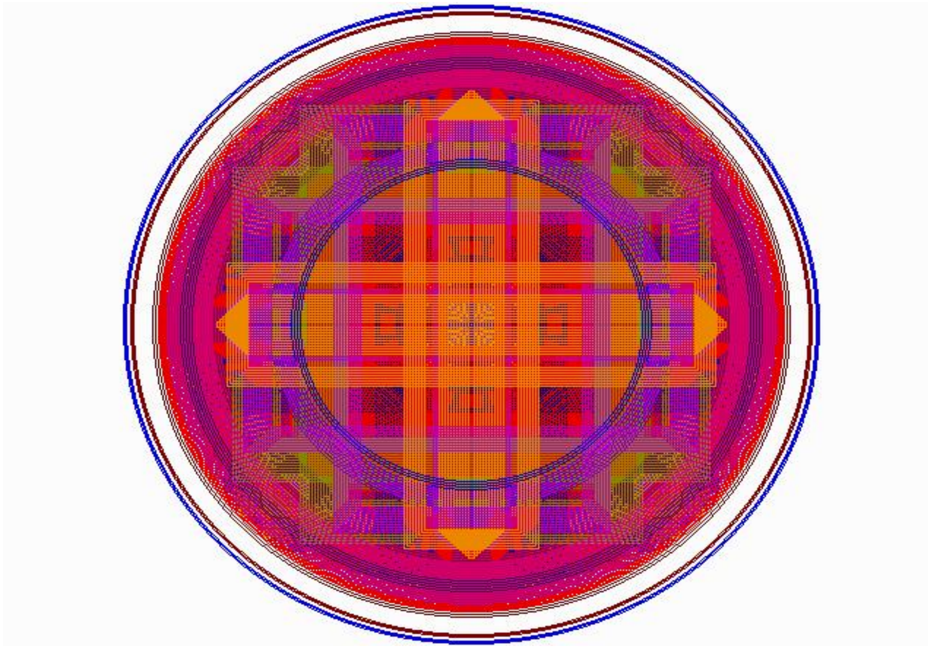
and the official Mega Society page,

http://www.megasociety.org/

Noesis, the journal of the Mega Society, #187, August 2008.

Noesis is the journal of the Mega Society, an organization whose members are selected by means of high-range intelligence tests. Jeff Ward, 13155 Wimberly Square #284, San Diego, CA 92128, is Administrator of the Mega Society. Inquiries regarding membership should be directed to him at the address above or:

ward-jeff@san.rr.com



Editorial

Kevin Langdon

Mega Society elections are overdue. As no one else has submitted a statement of candidacy to run for any of our three offices, the Administrator (Jeff Ward), Internet Officer (Chris Cole), and Editor (Kevin Langdon) are all declared reelected for another year (or what's left of it).

I'd still like to see a volunteer step forward to edit every other issue—or even to guest edit a single issue, perhaps on a subject of special interest.

This issue contains "Blindly Down a Separate Path: My Steps and Stumbles en Route to Discovering Spin-Stabilized Permanent-Magnetism-Induced Levitation," by Joseph Chieffo, Chris Harding's thoughts on the nature of time, Ian Goddard's "A Logic and Semantics for Imperatives," and three short pieces by May-Tzu..

The deadline for *Noesis* #188 is October 15, 2008. Material is needed. Please send us a letter, an article, or an image for publication.

Blindly Down a Separate Path

My Steps and Stumbles en Route to Discovering Spin-Stabilized Permanent-Magnetism-Induced Levitation

Joseph Chieffo

I remember standing between the bookcases, inured to the view framed by the texts and the ribs and flanks of skeletal steel, to missing bilateral solitude. It was 1977 and I was an evening student of Philadelphia's Drexel University, pursuing a first-rung degree in Physics. At the moment, I was scouring the library's Physics section, feeling frustrated at the dearth of "vital" information. Compounding my frustration was the realization that, at twenty-three years of age, I'd already grappled with the problem of permanent-magnetism-induced levitation for nearly three years, only to find that the full extent of my progress was succinctly summed up in the circumstance: there, between the cases and the book covers, I was groping for clues to a solution. Eventually, what I found was the law according to Earnshaw, the Reverend Samuel Earnshaw. More precisely, I'd found an author's read on the implications of Earnshaw's Theorem relative to the production of levitation using permanent magnets. In essence, it conveyed the impracticability of configuring permanent magnets in static formation such that an element thereof resides freely levitated through the effect of that formation. Still, "natural" levitation was an oxymoron; moreover, in light of my own age-cemented conjecture linking the two principal modes of disequilibrium, it appeared that spin-stabilization—a once indispensable tool in the investigation—was merely a compass in the hand of one bent on squaring the circle. The possibility of impossibility hadn't even occurred to me. Oddly, I felt at once disheartened and relieved: I would never know the beauty and the bliss of the phenomenon, nor would I have to. Of course corroboration was in order, but the perfunctory acknowledgement of a wisp of uncertainty failed to blunt my sense of finality. There would be no corroboration.

My ambivalence was short-lived, halted by a spontaneous launching into the spiraled wire realm of electromagnetism. I'd long thought of EM as my lifter of last resort, the tried and true glass-cased standby for the intrinsic force of the synthetic "leading stone." Now, after little more than one pane-shattering moment, I was fully immersed, reinventing the wheel of Ezekiel in miniature. In the months that followed, my academic aspirations turned to vapor. My future as theoretician pondering the fundamental nature of gravitation had itself become imponderable. Obsessed with "defying" gravity momentarily, I could no longer entertain dreams of wresting its secret twenty years hence, particularly in light of what I now perceived was the maddeningly circuitous curricular marathon that lay before me. Yet despite the stark inevitability, and despite my preoccupation with "foolish flight," I reeled at the realization: my formal education was over. Gradually, I grew despondent over my collapsed future and began to consider how little I knew and cared about electromagnetic levitation. The mode seemed tinged with an inelegant complexity that at once overwhelmed and underwhelmed me. My levitation dream soon succumbed, extinguished by a quitting-contagion.

Philosophy and mathematics engaged my creative passion through much of the next six years, though not so thoroughly as to preclude eventual, brief encounters of a third, improbable kind. It seemed the telekinetic blocks still exerted their influence, occasionally stirring me to toying attempts at coaxing behavior I'd once granted was impossible. It was probably nothing that years of habituation couldn't explain.

Maybe it was a matter of habit, or the gentle bleaching that is the passage of time; or maybe, somewhere within that mind's clearly defined strata of absolute black and indisputable white, was an indistinct diffusion of both. Whichever the case, it was looking as though my clarifying inoculation with Earnshaw might be in need of a booster. I was feeling unusually effervescent and robust that mid-September evening in 1984, imbued with possibility. There were no lines of force compelling, directing, or constraining me; no bearings that inspired and none that disinclined. There was, however, the delicate intimation that "tomorrow" could prove most propitious, that my magnetic flights of fancy seemed poised for an empiric-favoring metamorphosis. I decided that morning would allow for a taking up of the blocks. In the meantime, the eve was mine for basking.

The desktop laboratory seemed a mood-fitting change of setting. The apparatus thereof was starter-set simple; indeed, it was the selfsame ceramic-magnetic "floater-and-base" assembly that launched my investigation into PMI levitation nearly a decade earlier. Nevertheless this latest of prologues wasn't entirely about returning to configurative basics. It was, in a larger sense, the initial phase of an uncharacteristically unscripted investigation, a kind of instinctual bumping about. In taking the duster to the trial-worn ring and multi-layered, tape-bound plate, I'd answered the first in an emerging series of foot-turning intuitive nudges. To the casual observer, it was an answer that might have signified renewed willingness to compromise on levitation ideals; in fact, it was a response admitting of kindly nuance and my own mutability. A brisk and dexterous, midair turn of the ring was the only prerequisite, one that had furnished the operative linchpin for the arrangement since year one. Informed by a myriad of such executions, I knew well that spin imparted thus would serve to neutralize one of the two principal modes of disequilibrium; namely, that manifested by the intended floater's proclivity to flip and plunge under concerted magnetic influence. Yet experience had also taught that dissolution of the mode meant precipitation of its correlate, that spin, in effect, merely altered the aspect of failed flight, rendering it a swift curl to the plate's periphery. But now, in spite of that "inevitable" and once dispiriting trade-off, I felt intensely, playfully curious.

Picking up the conceptual pieces that I'd forsaken in my second year, I recalled two intriguing anomalies and an idea that would graze the consciousness from time to time. The former were stuttered translations in which the ring wavered, undulating mere ticks beyond the fuzzy frame of subliminal suggestion before giving familiar curvilinear expression to recondite natural principles. The latter was an obvious and, until now, dismissible innovation, conceived in a question: Might the fleeting exception suggest that sustained levitation could be produced through some alternative operation, one made practicable by the integration of magnetic ring and spinning top? Perhaps the idea had ripened through years of commingled aging with the well-impressed flickers of undulant flight, as I found myself hurriedly fingering through a miscellany of metal fasteners. I had my top within the minute, albeit in minimized and rudimentary form. Holding the ring on edge, as a collector might some numismatic curiosity, I made a gentle, bouncing sweep over the plate. Detecting the requisite “push,” I was now fully primed to begin testing. I centered the top and lightly pressed its riding point against the plate’s adhesive binding, and with a snapping twist of the stem, imparted rotation. The makeshift spinner wobbled about center, loosely locked in the ethereal grip of the field, providing what I construed as a seconds-long hint of favorable synergism. Further testing was in order.

Feeling for the next step, I quickly settled upon the idea of spinning the top on a stage positioned within the midair-launching zone of old. Once again, efficacy was lost in the translation from the conceptual to the concrete. It appeared the field had relatively little (or no) capacity for containment of the top at elevation. Still, I couldn’t rule out the possibility that “relatively little” would be absolutely ample. Presupposing what ostensibly was the least intractable circumstance, I assumed that my execution was simply too ham-handed to accommodate securement and paused to divine a means to exploit plate-level containment in the launch sequence. A reorienting thought emerged informing that it might be possible to manually raise a field-secured spinner into the launching zone. I snatched a nearby scrap of paperboard, laid it atop the base-plate, and initiated rotation thereon. Gingerly lifting the board, I watched intently for a hint of a near-threshold transition. The top abruptly catapulted from the surface, landing at the edge of the plate. I followed with a second attempt, and then a third. Each yielded the same curious, unincorporable result. Suspecting that the apparatus had become unusually forceful, recalling a magnetic coupling of the plate and desktop I'd noticed while setting up for testing, I was prompted to consider the possibility that the field was being amplified by the desk's sheet steel substrate. I removed a layer from the plate and repeated the launch sequence. Again the top was ejected, though clearly with diminished force. It appeared a subtle adjustment was needed.

Whether it was by stride or misstep, or desultory mix, the pace, I observed, was quickening. In a fit of rummaging for a field-abating shim—an as yet indeterminate article to fill an indefinite slice of space—a slender stack of scratch paper seized my attention. The realization struck that field intensity could, most probably, be adjusted on as fine a scale as buoyancy demanded. The extraction of a single plate-bearing sheet should effect a hairspring-gentle boost in the lift force, a singular addition, a subtle softening.

With a notepad-thick adjustment now in place, I resumed testing with a plunge, executing each function with a sense of impending definitiveness. Trial one finished with a “sliding egress,” a miss that I promptly, yet uncertainly, answered with an extraction. Trial two reproduced the result with a path-tracing exit, raising a suspicion that the field was both soft and pitched. Settings unaltered, trial three confirmed my suspicion, prompting a second trimming of the stack, followed by a tentative wedging of paper and plate along the traverse. Trial four delivered a concussive jolt, a spectacle for which I was thoroughly unprepared. In spite of all of my experience, reasoning, and imagining, and despite the progression of this latest line of inquiry, the incongruous vision of a seconds-long, midair lingering came as a stunning revelation. A minute or more would elapse before I would become sufficiently settled to fully assimilate the event.

Upon resetting, I proceeded from the position that the occurrence was merely a prelude, the opening step in a convergence toward sustained levitation. The steps were few; closing came quickly and was proclaimed in a most determinative sense. It was at the seventh launch, or thereabout, when space embraced the weighty top and held it up in lilting flight—in levitation! The top hovered for more than a minute, nearly an inch above the block-work plane, before the action of spin-erosive forces compelled its surrender. I paused for a steadying moment and then reengaged with another launch. The outcome was virtually the same. I then scrambled the settings and resumed the launch-and-adjust sequence in a test for reproducibility. The top was floating within minutes. Finally, I'd been persuaded: not only was levitation "by permanent magnet" possible, it was systematically demonstrable. Suddenly, I had neither the reason, nor the will to proceed. Putting the blocks aside, I marveled at a feeling. It was the sense that I was beneficiary to a world that proffers and embraces every imagining that derives from love, that I had taken more than enough to sustain me.

A Postscript to this Article

Within a year of my discovery, in the course of a patent search, I learned of a similar find predating my own by several years. It was the yield of inventor Roy Harrigan, of Vermont. When I entered into my pursuit of PMI levitation, I did so believing that had something so remarkable been crystallized, it would have been common knowledge. It was a belief that I held for more than a decade, one that proved to be a most auspicious "blunder."

jc*
11/28/05

My thanks go to Mike and Karen Sherlock for renewing my interest in matters of magnetic levitation, and for their unwavering support.

thoughtprints@yahoo.com

A Brief Reflection on the Nature of Time

Chris Harding

I have long puzzled as to the nature of time. Many have pointed to the strange one-way nature of time. Recently it has occurred to me that space and time are not in fact at all different from each other. One has only to picture a straight line or one-dimensional object then draw another line at 90 degrees to this. One has a 2-dimensional sheet. From an anchored perspective of the first dimension there is only one direction away from the first line; since the distance is at the point of experience of the second dimension already zero. The same applies to a line drawn at 90 degrees from the sheet. It is only when we move from the third to the fourth dimension that we see again the identical process re-enacted before our gaze. Thus to each of the dimensions the one above them appears 'time-like' in its nature. The critical thing is the imbeddedness or starting point of the perception. Thus the laws that operate to create the perception in the first place are a lowest common denominator expression of simplicity. For this reason there will be no laws of the universe which operate in the reverse direction. To the fourth dimension the fifth is equally one-way. But such higher laws will act above space-time and will have no bearing within our ~world~. They are simply too complex to fit into the limited and limiting complexity of ~our~ world. For this reason the laws knowable within our simple universe will be finite and few in number since the number of possible combinations is easily exhausted.

A logic and semantics for imperatives

Ian Williams Goddard

iamgoddard at yahoo.com

Truth is undefined for imperative statements. However, if imperatives implicitly reference a *fact*, they can be rephrased as truth-valuable declaratives explicitly referencing that fact. But are there such facts? Kenny held that any imperative references a *set of wishes* held by its imperator. I extend his thesis by proposing that imperator wishes are *facts* implicitly referenced by imperatives and explicitly referencing them yields semantically isomorphic declaratives. I implement this thesis with modal operators for *wants* and *cause* with which declarative schemata are formed to automate translation of imperatives into semantically isomorphic declaratives called *proxy-imperatives*. The proxy-imperatives match imperative behavior and provide semantic validation of imperative arguments thereby integrating imperative reasoning into classic truth-valuable logic.

1. Introduction

1.1 The problem

Formal semantics defines criteria for evaluating the truth of declarative statements with respect to domains of discourse. However, imperative statements like “Shut the door!” are not obviously true or false in any domain and therefore fall outside the realm of truth-valuable statements. Without truth values imperative arguments cannot be shown to be truth preserving, or semantically valid, even if they are intuitively valid. As such, it is held that imperative arguments, which form a large body of everyday arguments, fall outside the scope of formal logical reasoning. This paper proposes to bring them in scope.

1.2 The path followed

Given their lack of truth values, proposed imperative logics often define alternatives to truth. An important example is Anthony Kenny’s substitution of being *satisfactory* in place of being *true*. An imperative is satisfactory just in case obeying it will satisfy the *wishes* an imperator intends to express. So for example, if I want someone to close the door, the statement “Shut the door!” is satisfactory because its fulfillment by a listener will make my wish come true. Given this alternative to truth, Kenny proposed that just as the goal of classical declarative logic is to preserve truth, the goal of an imperative logic should be to preserve *wishes* from assumptions to conclusions in imperative argumentation.(1)

Kenny's *wish-preserving* criterion is intuitive. For example, from "Shut the door!" one should not expect it to be possible to infer any imperative that upon obeying keeps the door open. This gives us important insight into both what we want an imperative logic to *do* and what imperatives *are*. Even Kenny's critics didn't dispute his wish-preserving criterion but faulted his logic instead for its failure to actually preserve wishes.(2)(3) But for us here, what matters is Kenny's insight that an imperative denotes a set of wishes -- an insight we'll implement explicitly. We'll avoid the problems raised against his logic by relying on classic truth values acquired by translating imperatives into truth-valuable declaratives that directly reference the contents of an imperator's *set of wishes*.

Translating imperatives into declaratives to express their meaning is not new. For example, H. G. Bohnert proposed: "There exists a set of grammatically declarative sentences which can be put in one-to-one correspondence with commands." He posited such a mapping wherein any command A can be translated into a declarative of the form *Either obey A or else M will happen*, where M is a motivating factor intended to compel compliance. (4) R. M. Hare also explored this approach, noting that for any declarative describing an event, "we can frame a corresponding imperative sentence commanding that event to happen." (5)(6) In contrast, I simply propose that declaratives denoting what an imperator *wants* are the most suitable declarative translations for imperatives.

2 The *wants* premise

Kenny's premise that an imperative expresses an imperator's wish for a goal state is my premise too. By this premise, what an imperator *means* is what the imperator (or anyone compelling them to speak) *wants*. This is the natural interpretation of imperatives. If you are told "Do it!" you assume someone *wants* you to 'do it', otherwise the statement is not a true command. So we shall define declaratives that express the meaning of imperatives such that the declaratives are *true* just in case an imperator actually *wants* done what his or her imperative instructs listeners to do. Such imperatives are said to be *sincere*.

It should be noted that Hare has observed that imperatives can be translated into declaratives denoting what an imperator *wants* such that "Shut the door" means the same as "I want you to shut the door." (7) But he built no analysis from that. Figure 1 below illustrates the concept underlying my thesis that shall be rigorously implemented.

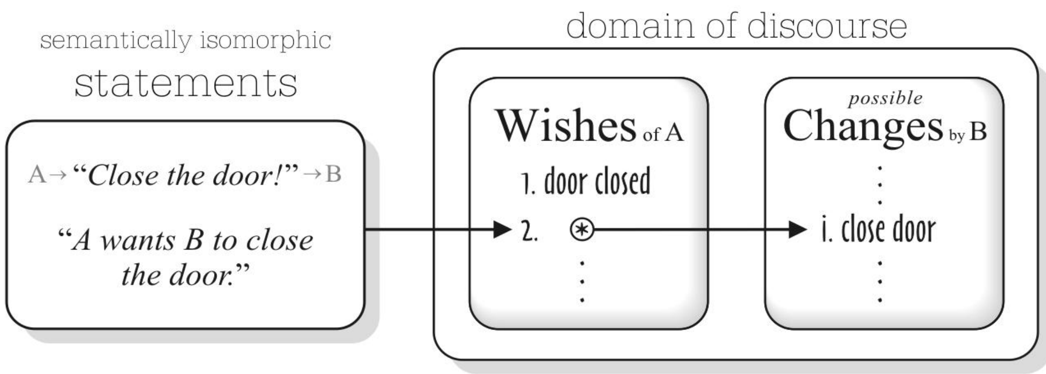


Figure 1. *Thesis: for any imperative there's a semantically isomorphic declarative that explicitly references an imperator's wish for a listener-caused change (2) that makes a primary wish (1) true.*

To flash forward briefly, the semantic structure in Figure 1 shall be explicitly implemented with modal operators that denote Wishes and possible Changes above. Given a set of conceivable states of affairs S = $\{r, s, t, \ldots\}$, Wishes maps members of a set of agents A = $\{a_1, \ldots, a_n\}$ to members of the power set of the cross-product of S, $\mathcal{P}$(S×S), whose members are sets of state pairs. So for example, suppose for simplicity that Wishes(a_1) = $\{(s, u)\}$, then the *set of wishes* of agent a_1 contains one wish (s, u) that means: in state s agent a_1 *wants* state u. Changes shares the same structure except that if Changes(a_1) = $\{(s, u)\}$, then (s, u) means: in state s agent a_1 *can cause* state u. This semantic structure is illustrated below in Figure 2 showing a subset tree of $\mathcal{P}$(S×S).

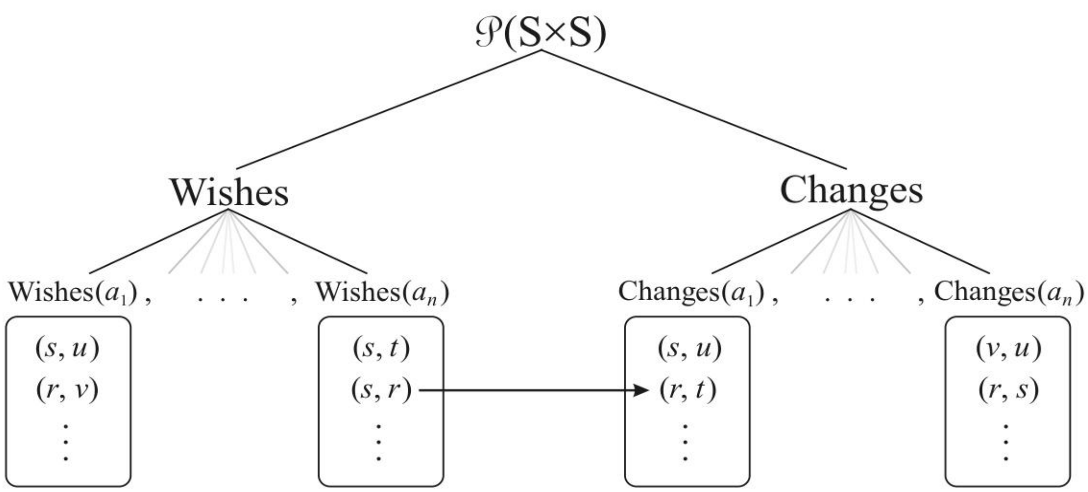


Figure 2. *A subset tree of* $\mathcal{P}$(S×S) *forms a modal frame used to formally implement the conceptual semantics seen in* Figure 1. Wishes *and* Changes *form subsets of* $\mathcal{P}$(S×S) *that contain sets of state pairs where each set represents an agent's wants or state-transitions agents can cause. The arrow in* Figure 2 *replicates the arrow in* Figure 1 *(except agents A and B there are here* a_n *and* a_1 *respectively). The arrow also represents the mapping of the proxy imperatives we'll define with* Wishes *and* Changes.

The objection might be raised that *wanting* is a mental state, and mental states are not properly objects of formal logic. However, epistemic modal logic defines operators for knowledge, and *knowing* is also a mental state. So it's not the case that mental states are not objects of formal logic. Now, let's define a language to implement the *wants* thesis.

2.1 A proxy-imperative language L

The language L defines agent-specific modal operators for *wants* and *cause*. L is similar in construction to epistemic logics. For example, Fagin *et al.*[8] define knowledge operators indexed to intelligent agents such that for n agents there are $K_1, \ldots, K_n$ operators where each K_i means "Agent i knows" and so $K_i\varphi$ means "Agent i knows φ" where φ is a proposition variable. We'll also define modal *wants* and *cause* operators that are specific to agents. Let us then begin with a generative grammar for L.

DEFINITION 1 (*language* L). Given a *vocabulary* = $\langle$P, N, U, B, M, A$\rangle$ composed of six sets of *atomic propositions* P = $\{p, p', \ldots\}$, *names* N = $\{n_1, \ldots, n_n\}$, *unary connectives* U = $\{\neg\}$, *binary connectives* B = $\{\rightarrow, \wedge, \vee\}$, *modalities* M = $\{[\omega], \langle\omega\rangle, [c], \langle c\rangle\}$, and *auxiliary symbols* { (,) } the *formulae* of L form the smallest set F such that:

1. If $p \in$ P, then $p \in$ F.
2. If $\varphi \in$ F, then $\neg\varphi \in$ F.
3. If $\circ \in$ B, and $\varphi, \psi \in$ F, then $(\varphi \circ \psi) \in$ F.
4. If $[\bullet], \langle\bullet\rangle \in$ M, $n \in$ N, and $\varphi \in$ F, then $[\bullet]n(\varphi), \langle\bullet\rangle n(\varphi) \in$ F.

The syntactic structure for the proxy-imperatives we'll define appears in 1.4 above. The ω modality means *wants* and the c modality means *cause*, which in Greek would be the *leipeic* and *aitic* modalities respectively. Each type $\bullet$ has two modes, one mode $[\bullet]$ expresses *necessity* and the other $\langle\bullet\rangle$ *possibility*. Accordingly, these modes shall have these preferred English interpretations (where φ is an arbitrary formula in F):

1. $[\omega]n(\varphi)$ reads: *n must have φ.*
2. $\langle\omega\rangle n(\varphi)$ reads: *n accepts φ.*
3. $[c]n(\varphi)$ reads: *n must cause φ.*
4. $\langle c\rangle n(\varphi)$ reads: *n can cause φ.*

Other translations are possible. Instead of 'must have' in mode 1 above we could say 'requires'. As for mode 2 above, 'accepts' may in some cases be replaced with 'likes', and so 'loves' might replace 'must have' in mode 1 since *likes* and *loves* reflect weaker and stronger modes of wanting. A number of English terms point in similar directions and could be chosen to describe specific situations in various domains of discourse.

Both *wants* and *cause* modalities have classic modal negation transformations with intuitive translations (left as an exercise for curious readers).

$$[\bullet]n(\varphi) \Leftrightarrow \neg\langle\bullet\rangle n(\neg\varphi) \qquad \langle\bullet\rangle n(\varphi) \Leftrightarrow \neg[\bullet]n(\neg\varphi)$$

$$[\bullet]n(\neg\varphi) \Leftrightarrow \neg\langle\bullet\rangle n(\varphi) \qquad \langle\bullet\rangle n(\neg\varphi) \Leftrightarrow \neg[\bullet]n(\varphi)$$

So for example, $\langle\bullet\rangle n(\neg\varphi)$ is the negation-normal form of $\neg[\bullet]n(\varphi)$, and each can replace the other due to their equivalence. Now we introduce the proxy-imperative schemata.

2.2 Proxy-imperative schemata

From the modes of *wants* and *cause* the *proxy-imperative* schemata are formed:

1. $[\omega]n[c]n'(\varphi)$ reads: *n must have it that n′ must cause φ.*
2. $[\omega]n\langle c\rangle n'(\varphi)$ reads: *n must have it that n′ can cause φ.*
3. $\langle\omega\rangle n[c]n'(\varphi)$ reads: *n accepts that n′ must cause φ.*
4. $\langle\omega\rangle n\langle c\rangle n'(\varphi)$ reads: *n accepts that n′ can cause φ.*

These are the statement schemata we'll use for proxy-imperatives. It's essential to note that they do *not* denote imperative statements but rather *facts* that hold true about any imperator. The proxy-imperatives denote *preconditions* for the utterance of imperatives that also hold true concurrently with imperative utterance. Proxy-imperatives can be true even if no imperative is uttered. To denote in our translations that the utterance of an imperative has occurred, 'must have it' in 1 above may be replaced with 'demands' or 'commands'. And 'asks' or 'requests' may replace 'accepts' in 3 and 4. Not expressly denoting an utterance, 'allows' or 'permits' may also replace 'accepts'. Many English terms point in similar directions.

Schema 1 denotes conditions underlying the strongest imperatives, *commands*, which denote the highest degree of wanting and of necessity of compliance. On the opposite end, schema 4 models *requests*, the least urgent and most polite imperatives like: "If possible, please pick up some milk after work," or "Could you please pass the salt?" The four proxy-imperative schemata can cover a wide range of imperative statements.

L AXIOMS: for all $[\bullet]$, $\langle\bullet\rangle \in$ M, all n, $n' \in$ N, and any $\varphi \in$ F we accept as true:

1. $[\bullet]n(\varphi) \Rightarrow \langle\bullet\rangle n(\varphi)$
2. $[\omega]n[c]n'(\varphi) \Rightarrow \langle\omega\rangle n(\varphi)$

In the case of *wants* (ω), Axiom 1 says: *if n must have φ, then n accepts φ.* Obviously, if I must win, I'll accept winning. For *cause*, Axiom 1 says: *if n must cause φ, then n may* *cause φ*. These are both not only intuitive but Axiom 1 also prevents vacuous truth for the necessary modes in our semantics, as we shall see shortly. Axiom 2 says: *if n must have it that n′ must cause φ, then n accepts φ*. Axiom 2 says all imperatives are sincere.

2.3 Proxy-imperative behavior

Now we'll compare proxy-imperatives with real imperatives. First, observe that because the minimal mode of wanting $\langle\omega\rangle$ denotes what is *acceptable*, a negated proxy-imperative command is not a model for a contrary command but instead for contrary *permission*.

$$\neg[\omega]n[c]n'(\varphi) \quad = \quad \langle\omega\rangle n\langle c\rangle n'(\neg\varphi)$$

It's not the case that n demands n′ must cause φ = n accepts that n′ may cause not-φ

That equivalence implies that the negation of "Shut the door!" is not the contrary command "Don't shut the door!" but the contrary permit: "You may leave the door open." So according to the proxy-imperatives of L, a negated command *repeals* the command and *permits* contrary behavior. This in fact matches natural commands of which public laws are canonical. Take for example the military draft. What happens when we repeal a command by a *leader* that any man, let's say *Jon*, must enlist? Let's see (the proposition *p* that's commanded to be made true is '*Jon is enlisted.*')

(*a*) $[\omega]$*leader*$[c]$*jon*('*Jon is enlisted.*')

Reads: *The leader commands that Jon must enlist.*

So the negation of command *a* above is by negation normalization b, c, and d:

(*b*) $\neg[\omega]$*leader*$[c]$*jon*('*Jon is enlisted.*')

Reads: *It's not the case that the leader commands that Jon must enlist.*

(*c*) $\langle\omega\rangle$*leader*$\neg[c]$*jon*('*Jon is enlisted.*')

Reads: *The leader accepts that Jon need not enlist.*

(*d*) $\langle\omega\rangle$*leader*$\langle c\rangle$*jon*('*Jon is not enlisted.*')

Reads: *The leader accepts that Jon may not enlist.*

So according to both our proxy-imperatives and natural intuition, repealing a draft's command "Enlist!" does not mean "*Don't* enlist!" but rather: "You *may* not enlist." (This intuitive result suggests that there's an inherent modal structure in imperatives.) Obviously no person who understands the repeal of a draft would fear arrest for enlisting as he or she would not interpret its negation as a command against enlisting. The example above shows that natural language and intuition behave like the proxy-imperatives such that in both systems a negated command is not a contrary command but contrary *permission*.

2.4 A proxy-imperative semantics

And now let's explore the meaning, or semantics, of L and its proxy-imperatives. We do that with a model for L that defines a frame of objects and relations between them from which domains of discourse can be built and in which, by way of an interpretation, the statements of L have their meaning. Here then is such a model for L.

DEFINITION 2 (*model*). A model for language L is $M = \langle S, A, \text{Wishes}, \text{Changes}, \alpha, V\rangle$ where $\langle S, A, \text{Wishes}, \text{Changes}\rangle$ is a domain frame and $\langle \alpha, V\rangle$ is an interpretation for L:

1. S is a non-empty set of *conceivable states of affairs*: $S = \{s, s', s'', \dots\}$.
2. A is a non-empty set of intelligent *agents*: $A = \{a_1, \dots, a_n\}$.
3. Wishes : $A \to \wp(S{\times}S)$ assigns to each agent a *set of wishes* in $\wp(S{\times}S)$ containing state pairs such that if $(s, s') \in \text{Wishes}(a)$, then in state s agent *a wants* state s'.
4. Changes : $A \to \wp(S{\times}S)$ assigns to each agent a set of *causable* state transitions in $\wp(S{\times}S)$ such that if $(s, s') \in \text{Changes}(a)$, then in state s agent *a can cause* s'.
5. $\alpha : N \to A$ assigns *names* to *agents* such that $\alpha(n)$ is the agent named n.
6. $V : P \to \wp(S)$ is a *valuation function* that assigns to each L *proposition* a set of states such that if $V(p) = \{s, s'\}$, then proposition p holds true in states s and s'.

The L frame requires a wider set of states to draw from than an alethic frame because *wanting* casts a wider net over states than alethic *possibility* given that one can want the *impossible*. For example, you could want to be as big as a mountain or to travel in time, but such conceivable states are not possible states. So in the L frame the set of states S contains *conceivable states* that may be impossible but still wantable. On the other hand, Changes does assign access relations to agents. For all $a \in A$ and all $s, s' \in S$, if $(s, s') \in \text{Changes}(a)$, then state s' is possible from state s, and perhaps because agent a can cause s'. Conceivable states are plausibly infinite and possible states are a proper subset of S.

2.5 defines a name-assignment function α such that for any name $n \in N$, $\alpha(n)$ is the intelligent agent named n in the domain of discourse.(9) If for any agent $a \in A$ we have it that $a = \alpha(n)$, then $\text{Wishes}(a) = \text{Wishes}(\alpha(n))$. So we may represent the arbitrary agent by either a or $\alpha(n)$, and we use $\alpha(n)$ in Definition 3 below. Definitions 2.3 and 2.4 above are foundational to my imperative thesis and follow standard modal definitional structure with the exception that they serve to model modes of *wanting* and *causability* respectively rather than alethic *possibility*, deontic *obligation*, or epistemic *knowing*.

DEFINITION 3 (*semantics*). Given L model M, the *truth conditions* in any state $s \in S$ are (where $(s) \vDash \varphi$ is read: *in state s, φ is true*):

1. $(s) \models p$ *iff* $s \in \mathrm{V}(p)$.

2. $(s) \models \neg\varphi$ *iff* $(s) \not\models \varphi$.

3. $(s) \models \varphi \rightarrow \psi$ *iff* $(s) \not\models \varphi$ or $(s) \models \psi$.

4. $(s) \models \varphi \wedge \psi$ *iff* $(s) \models \varphi$ and $(s) \models \psi$.

5. $(s) \models \varphi \vee \psi$ *iff* $(s) \models \varphi$ or $(s) \models \psi$.

6. $(s) \models [\omega]n(\varphi)$ *iff* for all $s' \in \mathrm{S}$, if $(s, s') \in \mathrm{Wishes}(\alpha(n))$, then $(s') \models \varphi$.

7. $(s) \models \langle\omega\rangle n(\varphi)$ *iff* for a $s' \in \mathrm{S}$, $(s, s') \in \mathrm{Wishes}(\alpha(n))$ and $(s') \models \varphi$.

8. $(s) \models [c]n(\varphi)$ *iff* for all $s' \in \mathrm{S}$, if $(s, s') \in \mathrm{Changes}(\alpha(n))$, then $(s') \models \varphi$.

9. $(s) \models \langle c\rangle n(\varphi)$ *iff* for a $s' \in \mathrm{S}$, $(s, s') \in \mathrm{Changes}(\alpha(n))$ and $(s') \models \varphi$.

By Axiom 1, in any L-model M, if $(s) \models [\omega]n(\varphi)$, then $(s) \models \langle\omega\rangle n(\varphi)$. So by Definitions 3.6 and 3.7, every agent *wants* at least one conceivable state. Otherwise, $[\omega]n(\varphi)$ can be vacuously true by Definition 3.6 when agent $\alpha(n)$ wants *no* state. This *serial* condition also blocks vacuous truth in alethic modal logic and applies to the *cause* modality such that every agent *can cause* at lest one state. Axiom 1 is intuitively valid as well. (10) Definitions 3.6 through 3.9 are unique and implement my thesis.

Definitions for the proxy-imperatives follow directly from Definitions 3.6 through 3.9. However, it's worth presenting them explicitly. They are for brevity presented in meta-logic rather than the meta-language of English used for Definitions 3.6 - 3.9.

DEFINITION 3 (amendment - *proxy-imperative definitions*)

10. $(s) \models [\omega]n[c]n'(\varphi)$ *iff*:

$$\forall s'\forall s''[\ (\ (s, s') \in \mathrm{Wishes}(\alpha(n)) \wedge (s', s'') \in \mathrm{Changes}(\alpha(n'))\ ) \Rightarrow (s'') \models \varphi\ ]$$

11. $(s) \models [\omega]n\langle c\rangle n'(\varphi)$ *iff*:

$$\forall s'[\ (s, s') \in \mathrm{Wishes}(\alpha(n)) \Rightarrow \exists s''(\ (s', s'') \in \mathrm{Changes}(\alpha(n')) \wedge (s'') \models \varphi\ )\ ]$$

12. $(s) \models \langle\omega\rangle n[c]n'(\varphi)$ *iff*:

$$\exists s'[\ (s, s') \in \mathrm{Wishes}(\alpha(n)) \wedge \forall s''(\ (s', s'') \in \mathrm{Changes}(\alpha(n')) \Rightarrow (s'') \models \varphi\ )\ ]$$

13. $(s) \models \langle\omega\rangle n\langle c\rangle n'(\varphi)$ *iff*:

$$\exists s'\exists s''[\ (s, s') \in \mathrm{Wishes}(\alpha(n)) \wedge (s', s'') \in \mathrm{Changes}(\alpha(n')) \wedge (s'') \models \varphi\ )\ ]$$

Figure 3 below extends Figure 2 by articulating the mapping on $\mathcal{P}(\mathrm{S}\times\mathrm{S})$ that builds the proxy-imperatives. Each proxy-imperative for some imperator agent $\alpha(n)$ explicitly denotes the set $\mathrm{Wishes}(\alpha(n))$ which is that agent's *set of wishes*. This is an explicit implementation of Kenny's thesis that an imperative denotes its imperator's set of wishes, but we extend from his thesis by adding the *cause* modes that conjoin with the *wants* modes to form the proxy-imperatives as part of what is wanted is a change or null-change.

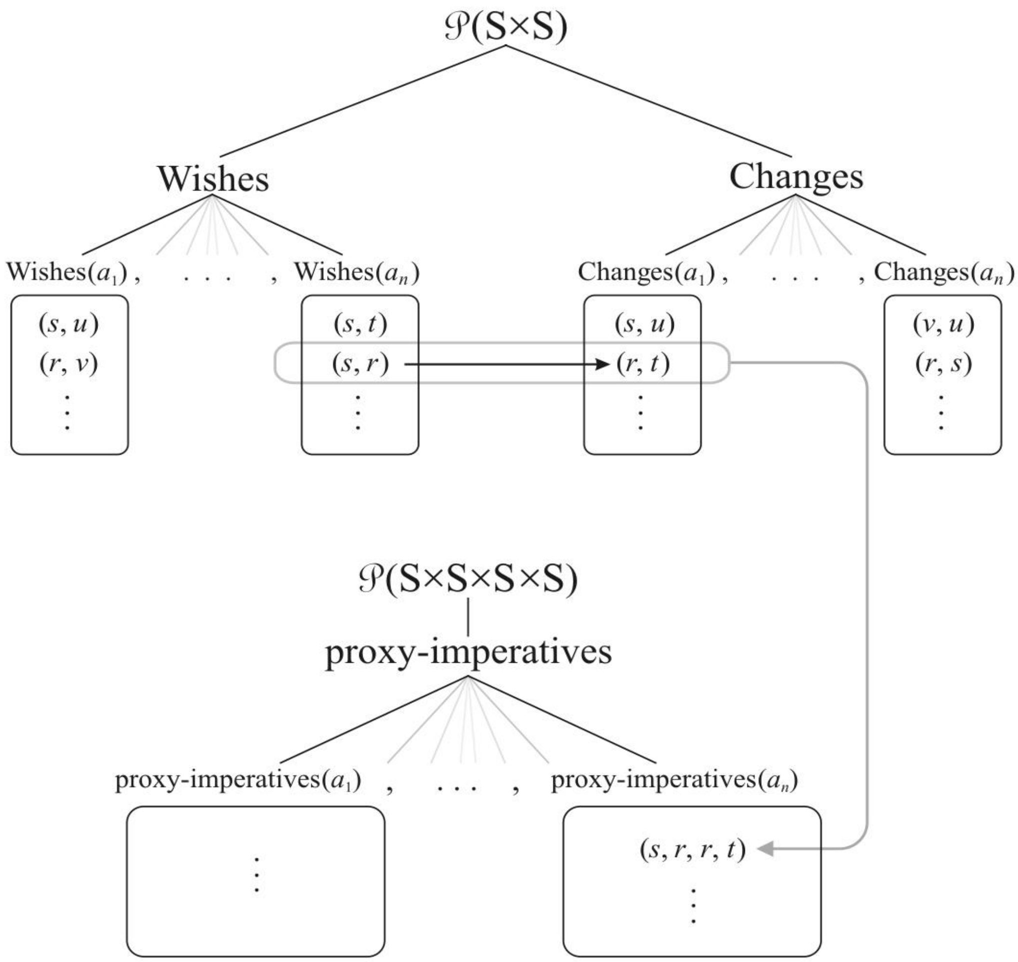


Figure 3 *the subset tree of* S×S *branches into subsets* Wishes *and* Changes*, each divided into subsets, one for each agent* α(*n*). *Implementing the concept shown previously in* Figure 1*, here we have an example of agent* $\alpha(n_n)$ *in state s wanting agent* $\alpha(n_1)$ *in state r to cause state t. The resulting mapping to and from* S×S *forms a subset of* (S×S)×(S×S) *called* proxy-imperatives *which is divided above into subsets each of which contains state-quintuples that are preconditions for specific imperatives an agent may utter.*

3 By proxy semantic validation of imperative argument

Now we put our proxy-imperatives to work to provide semantic proofs by proxy for imperative arguments. We assume that any meaningful imperative has an imperator and thus that there is at least one agent who *wants* it obeyed and whose name is *i*. Below, a natural-language imperative argument appears on the left (steps 1a, 2a, and 3a) and its translation into L appears on the right (steps 1b, 2b, and 3b). Assume for this argument that proposition p = '*You see Jesse*' and q = '*The police are notified*'.

1a. If you see Jesse, call the police!	1b. $p \rightarrow [\omega]i[c]n(q)$
2a. You see Jesse.	2b. p
3a. Call the police!	3b. $[\omega]i[c]n(q)$

PROOF: By 1b we assume that in model M, $(s) \vDash p \rightarrow [\omega]i[c]n(q)$. By Definitions 3.1 and 3.10 this means that we accept as true that if state $s \in$ V(p), then for all s', $s'' \in$ S, if $(s, s') \in$ Wishes($\alpha(i)$) and $(s', s'') \in$ Changes($\alpha(n)$), then $(s'') \vDash q$. Now, by 2b we have it as a fact that state $s \in$ V(p); therefore, by assumption 1b and Definition 3.10 we also have it as a fact that for all conceivable states s' and s'', if agent $\alpha(i)$ *wants* state s' and in state s' agent $\alpha(n)$ *must cause* state s'', then in state s'' proposition q is true, which is to say by Definition 3.10 again that we have it as a truth that: $(s) \vDash [\omega]i[c]n(q)$.

Since perhaps most imperative arguments can be expressed in *modus-ponens* form as above, and because the proxy-imperatives are declaratives, it's trivial that we can provide semantic validation for any number of proxy-imperative translations of imperative arguments in the way shown above. So there's no need to belabor the point that here we have a mechanism of providing *by proxy* semantic validation of imperative arguments.

4 Conclusion

The goal of this project has been to understand the semantic structure of natural imperatives and from such insight build a formal model of imperative semantics that can integrate imperatives into classical logic. So matching the behavior of natural imperatives has been both a goal and guide. Following the frequented path of defining alternatives to truth values in a new kind of logical system used only for imperatives was not an attractive option. My goal has been to facilitate semantic evaluation of imperatives within *the same* semantic machinery used to evaluate declaratives. Such a model of imperatives would be the simplest model as it only requires preexisting modal-logic infrastructure. I believe and hope that the proxy-imperatives defined herein, which are declaratives that I posit as semantically isomorphic to imperatives, may be either a sufficient model of imperatives that brings them into the scope of classical logic or at least a useful start on that path.

---

(1) Kenny, A. J. (1966). Practical Inference. *Analysis*, *26*: 65-75.

(2) Geach, P. T. (1966). Dr. Kenny on Practical Inference. *Analysis*, *26*: 76-79.

(3) Gombay, A. (1967). What is imperative inference? *Analysis*, *27*: 145-152.

(4) Bohnert, H. G. (1945). The Semiotic Status of Commands. *Philosophy of Science*, *12*(4): 302-15.

(5) Hare, R. M. (1949). Imperative Sentences. *Mind*, New Series, 58(299): 21-39.

(6) Most research on imperative logic was done between the 1930s and 1970s. For a short review of some recent work let me suggest: Žarnić, B. *Imperative Negation and Dynamic Semantics* : http://www.vusst.hr/~berislav/personal/MeanDynTurn.pdf

(7) Hare, R. M. (1952). *The Language of Morals*. Oxford, Oxford University Press, p 5.

(8) Fagin, R., Halpern, J.Y., Moses, Y., & Moshe Y. Vardi. *Reasoning about knowledge*. Cambridge, Massachusetts, MIT Press, 1995.

(9) Definition 2.5 might seem to add excessive semantic machinery, however, it better segregates L syntax and semantics. For example, in Fagin *et al.* the number of modal operators $K_1, \dots, K_n$ in the language reflects the number of agents n in the domain.(4) But the number of modal operators in L syntax is independent of the number of agents in the domain. This abstracts the L modalities from domains. In natural thought, *wanting* and *causing*, as well as *knowing*, are concepts we've abstracted from our domains of experience such that we can conceive of them independent of specific instances. And so in natural language, *wants*, *cause*, and *knows* are atomic operators rather than *Adam wants*, *Amy wants*, … and so on, per person. For these and other reasons, I feel that the extra semantic machinery better models natural semantics.

(10) If you *must have p*, then you'll certainly *accept p*. So too, if you *must cause p*, you *can cause p*. The intuitive nature of Axiom 1 holds even in the extreme cases: (1) Even the most aesthetic Buddhist monk probably, for example, *wants* at least one thing, such as to not want anything else. And true non-wanting is classically (where it is held as a goal) and intuitively associated with the absence of selfhood and thus with *not being an agent.* (2) Even someone tied up *can cause* mental states in self or others. But anything that can't cause a mental, or cognitive, state, at least in itself, is not intuitively an agent. So it seems that wanting and being able to cause are intimately associated with being an intelligent agent, and thus every agent must *want* at least one state and be able to *cause* at least one state as Axiom 1 requires.

May-Tzu's Wager

It is extremely improbable that God exists.
But it is certain that I do not exist.
Therefore, the existence of God is a much better bet.

—May-Tzu

No Mirrors

Sitting in a room observing myself
sitting in a room observing myself,
slumped, chin in hand,
supporting a concatenation of jokes in a black cap . . .
no Buddhas.
How to steal the truth
from a thief who stole the truth?
Sitting in a room observing myself
sitting in an empty room observing myself.

—May-Tzu

Behold

A falcon's view
in a breath of time:
seeing no I shadow;
silence of wind chimes.

—May-Tzu