

Two from's?

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Two from's?

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“Upon those who step into the same rivers flow other and yet other waters.”

Heraclitus

The present paper addresses a problem which starts out with the preposition from, but which ends up involving us in waters with a universal taste, waters which seem to be deep indeed. From the point of view of from, we can see the problem arise in the fact that we would like to be able to say that the basic sense of this preposition, a sense which specifies the Source of a physical movement, as in (1),

- (1) Valmir moved the rocks from the car.

can be extended to more and more metaphorical uses, some of which we see examples of in (2):

- (2) a. Ted learned calculus from Vânia.
b. I can see from this article that we are doomed.
c. We benefited from Otimar's experience.
d. Cleuza prevented Mônica from committing a worse gaffe.

Somewhere in such sequences, we will probably want to say things about from being grammaticalized; for the present, let us leave open just where we might feel that from has cut its ties with its basic motional sense. What I want to show is that even in a sentence like (3),

- (3) Ileen cleared the snow from the hood.

where it is clear that we are talking about the movement through physical space of a semantic Theme (the snow), and also that the hood denotes the place where that movement starts, even in such a sentence, we find that what look like the seeds of grammaticalization have been sown. While we might feel no queasiness about saying that there are two from's in (1) and (2d), say – can we really be happy if we have to say that there is a third one in (3)? The discussion to follow can be localized conceptually by calling it some reflections on emergent grammaticalization, where I use emergent as it has been used in work on discourse and grammar, such as that of Du Bois (1987) and Hopper (1988).

I.

Basics about paths

Before we can talk about how (1) might be different from (3), let us observe some basic facts about the grammar of motion. I see all motion clauses as involving a Theme, Jeff Gruber's seminal term for “that which moves,” and a Path, a term which I believe Len Talmy was the first to use in this context. Let us look in some detail at the structure of paths.

- (4) Paths are macroconstituents which break down into three legs: an (optional) initial leg (a **Source**) [e.g., from Prince George], then any number of optional medial legs (**Trajectories**) [e.g., PP's headed by P's like past, along, by, through, etc. – e. g., along Route 1 past Sebastopol through the Napa Valley], and finally an (optional) final leg (a **Goal**) [e.g., to Berkeley]. Each leg can be modified by PP's of **Extent** [e.g., (for) two miles] and of **Direction** [e.g., (towards the) north, up(wards), in(wards), and so on. An example of a fairly developed Path would be

[out from LA 1 [65 miles north along the coast] [down back east for 13 kilometers into San Gofers]

- (5) Here and there (and now and then) are restricted to appearing in spatial (or temporal) paths. Thus (a), which is spatial, is OK with there, but not (b), which is not spatial:

- a. Max was interred in the back yard / there.
- b. Max was interested in the back yard / *there.

Similarly, since the from-phrase in (c) is part of a temporal path, it can be pronominalized by then, a possibility which does not exist for the non-path from of (d):

- c. Terry worked from Christmas / from then to March.
- d. Terry separated Hanukkah from Christmas / *from then.

- (6) Right can only modify PP's in paths:

- a. Max was interred (right) in the back yard / (right) there.
- b. Max was interested (*right) in the back yard / (*right) there.

- (7) The ends of paths [i.e., their initial and final legs] are much richer in structural variety, in many ways, than are their medial legs. Thus the two end-prepositions from and to cooccur with many structures that medial prepositions cannot be followed by.

For instance, end-prepositions can be followed by there preceded by modifying directional particles like up, down, in, out, etc., while medial P's like past can't:

- a. Mrs. Smithson hopped from (up) there / from (in) there / to (back) there.
- b. Mrs. Smithson hopped past (*up) there / past (*in) there / past (*back) there.

End-prepositions can be followed by PP's, medial P's can't. Thus from and to can be followed by certain locative PP's, as in (c).

- c. Mrs. Smithson hopped from under the bridge / to behind the old oaktree.

Since the phrases from under the bridge and to behind the old oaktree represent whole path constituents in (c), they can appear in inverted structures like those in (d) and (e):

- d. From under the bridge hopped Mrs. Smithson.
- e. To behind the old oaktree hopped Mrs. Smithson.

However, medial prepositions like past cannot be followed by PP 's, as we see in (f) and (g).

- f. (*)Mrs. Smithson hopped past under the bridge.
- g. (*)Mrs. Smithson hopped past behind the old oaktree.

It is not that (f) and (g) are ungrammatical on all readings, for they have an interpretation under which they are understood as reduced forms of something like (h) and (i):

- h. Mrs. Smithson hopped past me (us, them, . . .) under the bridge.
- i. Mrs. Smithson hopped past me (us, them, . . .) behind the old oaktree.

The rule which deletes the anaphoric expressions which are the objects of past is restricted: it only applies if past is after the verb. Thus if we prepose the entire path structures in (h, i), we preserve grammaticality,

- h'. Past me (us, them, . . .) under the bridge hopped Mrs. Smithson.
- i'. Past me (us, them, . . .) behind the old oaktree hopped Mrs. Smithson.

but not if we try to reduce these preposed forms:

- h''. *Past under the bridge hopped Mrs. Smithson.
- i''. *Past behind the old oaktree hopped Mrs. Smithson.

Thus we can see that while it would be correct to say that the PP under the bridge appears as (part of) the object of from in (c) [I say "part of" because I believe things are a bit more complicated here than I can discuss in detail], with the phrase from behind the old oaktree representing a complex Source, no such story will serve in the case of a sequence like past under the old oaktree, which does not represent a single PP, but rather a concatenation of two of them, the first one having its object, an anaphoric pronoun, deleted.

- (8) The objects of end-prepositions can be adverbial non-specific indefinite expressions like some / any / no / every + -where / -place, or the spatial question where. Such words do not follow medial prepositions:

- a. Crickets were hopping from everywhere / *past everywhere.
- a'. Where were crickets were hopping from / *past?
- b. Our company is not retreating to anyplace / *through anyplace.
- b'. Where is our company retreating to / *through?

- (8) c. Mrs. Smithson did not hop from anywhere / *by anywhere.
 c'. Where did Mrs. Smithson hop from / *by?

II. Two types of adverbial proforms

I would like to expand briefly on one of the points made above in (5) – the behavior of proforms such as there and then. For it turns out that there are two types of these proforms – one which I will call PP-proforms and another which I will call NP-proforms. The former type is only found after the two end-prepositions from and to (and as free-standing adverbs, as in I lived there then), with the latter type occurring in all other contexts. The former type is more fluorescent, allowing modification by right, and, for spatial proforms, premodification by the small group of what I call directors – words like up, down; in, out; over, under; around, back, and possibly a few more. Thus we find contrasts like the following:

- (9) a. Fernandão jumped from (right) there / from (down) here.
 b. (Right) now, Fernandão lives (right) there / (back) here.
- (10) a. Fernandão jumped through ((*right) there / ((*down) here).
 b. Through (*right) there / Through (*down) here jumped Fernandão.

I have starred the versions of (10a) which include modifiers for the same reasons as those which led me to star the interpretations of (7f,g) under which through represents a reduced Trajectory, a possibility which the inverted order of (10b) excludes. While it would take me beyond the scope of this paper to justify this suggestion, I believe the route to an adequate understanding of such contrasts as those we see between (9) and (10) will lie in allowing that an anaphoric object of any preposition in a spatial path can be there, and further, that a deeper structure of a phrase like from there will contain a locative preposition like at, whose object is the there: [from [at there]]. By contrast, a comparable structure for a medial PP would be just [through there]. It is the “embedded” at-phrase which is allowing premodification by right and the directors in (9) – such words can never modify non-PP adverbial NP’s such as the objects of medial prepositions.

It is of great interest that when a verb like depart, which can occur with an end-preposition like from, comes to lose this preposition, presumably via a syntactic rule, the properties of the there-object of the deprepositionalized verb become those of an NP-proform, and not those of the PP-proform there which follows the unreduced verb depart from. This we can see from the contrast in (11).

- (11) a. We will depart (from) Des Moines at noon.
 b. We will depart from (right) there / from (down) here at noon.
 c. We will depart (*right) there / (*down) here at noon.

The interested reader can find a more fleshed out version of an analysis involving a deleted at in the objects of end-prepositions in Ross (to appear). In (12) below, I summarize the differences one finds between the two types of adverbial proforms, as well as those between the two types of spatial prepositions.

(12) The two there's

Adverbial there
 [after end-prepositions]
 from (right) there
 to (up) here
 from behind the tree
 from somewhere

Nominal there
 [after other spatial P]
 along (*right) there
 past (*up) here
 *past behind the tree
 *through somewhere

[and after deprepositionalized
 verbs]

depart from (right) there
 depart from (up) there

depart (*right) there
 depart (*up) there

III. Two (?) from's

I believe that we can now profitably address the question as to the ways in which verbs whose semantics involves the physical motion of a theme from a Source can differ from each other. I am at present unclear as to how many differing types of such verbs English manifests. It may be that it will be possible to establish some such hierarchy as that suggested in (13), or further study may show that we are here dealing with some small number of discrete categories. For now, I can only leave this matter open.

(13)	Purely spatial	□	Less spatial		
	move	sweep	empty	clear	steal
	carry				
	lug				
	lift [= cause to rise]				lift [= steal]

What is important is to recognize that while there is some number of verbs which are purely motional (those on the left side of (13)), whose emphasis is on the Theme, and only secondarily on the NP's in the legs, there are others which shift this focus from the Theme to the effects of the motion on the NP in the Source leg. These latter verbs, which I propose to call privative verbs, will deemphasize the fact that this Source constituent is the first in a path, sometimes to such an extent that other types of path-constituents cannot even be expressed. I will use move as an example of a prototypical motional verb, and steal as a prototypically privative one. Those who like examples which contain lexical minimal pairs may want to compare the basic sense of lift with its idiomatic sense, on which it is identical to steal.

What are the types of contrasts that we might expect? First of all, with move, there should be no restriction whatsoever on the number or kind of legs which its Theme is described as traversing, nor on the internal structures of such legs. By contrast, with privative verbs, we may well predict that restrictions will begin to make themselves felt. In the examples below, I will contrast these two verbs, and sometimes others, with respect to various parameters. The judgements, which are often subtle, are my own, as best as I can tell. I will prefix each example sentence with an indication of its degree of acceptability to me, though I do not

expect any other speaker to agree in detail with my judgements. What I hope that a more careful look at patterns of interspeaker variation will reveal is that the direction of preferences, which I indicate with the symbols for inequality, ‘ \geq ’ and ‘ \leq ’, will prove to be constant. That is, if I write ‘ $A \geq B$,’ for some pair of sentences A and B, whatever individual ratings of grammaticality I have assigned to them, my claim is that if any speaker feels there to be a difference between the two, that speaker should find A to be superior to B. My claim will be counterexemplified only if there are speakers who judge in the opposite direction – that is, for them, B is better than A. I remark in passing that I think that such judgements are probably the most that we can expect to survive intersubjective testing. Thus it is such inequalities, rather than the rarely attainable judgements of total grammaticality, or total impossibility, for all speakers, which should be the basic coin of the realm of syntax.

With this in mind, let us look at some of the inequalities that from offers to our inspection.

Basic. motional from
[full path possibilities]

Privative from
[fading spatiality]

Predicted differences

(14) Full path structures

Defective paths

- a. move it from LA along 405 to SF \geq steal it from him
(**along 405) (*to me)

[Here we find, as predicted, that while move allows paths with all types of legs, steal only allows the specification of a Source. While mentioning the destination of the theft is terrible, for me, trying to specify its Trajectory attains Larry Horn’s category of “splendid ungrammaticality,” though it seems that certain Trajectories (I am thinking here of through the window) escape this fate.]

- b. Where did he move it from? \geq ?Where did he steal it from?

[Here, I sense a slight distinction, characterizable perhaps along the following lines. While move foregrounds the Theme, backgrounding the path, steal foregrounds the Source, which is prototypically a human. The basic function of the morpheme -ere (used in here, there, and where [and in compounds like therein, whereafter, etc.]) is to signal that it is part of a path – to be precise, part of a backgrounded path. Thus the contrast between -ere, on the one hand, and third-person forms like she, it, he, they, and also what and who, on the other, is fundamentally one of focus.

If these speculations are on the right track, the best question-word, for motional verbs, should be where. What should be slightly dispreferred, since it is a member of the set of in-focus proforms, and who should be the least preferred, for reasons of topicality, since human NP’s will always be more salient, and thus topical, than will non-humans. By contrast, since the prototypical Source for steal should be human, where should be the worst question-word, with who being the best, and what being intermediate. These considerations are confirmed by the inequalities in (b') and (b'') below.]

- b'. What did he move it from? \geq ?What did he steal it from?
 b''. ??Who did he move it from? \leq Who did he steal it from?

Ceteris paribus, the same will hold for the anaphoric adverbial proform there. In (c), I believe that for me, there are even small differences between the various items in (13)'s progression from more to less spatial verbs.

- c. move them from there \geq ?sweep the dirt from there \geq
 ?empty the ale from there \geq
 ??steal his car from there
- d. move them from (behind) \geq sweep the dirt from (?behind)
 the garage the garage \geq
 steal his car from (??behind)
 the garage

[I am unclear as to how to treat these examples. I believe it to be correct to claim that the more motional a from is, the easier it is to find it followed by PP's in surface structure. Whether this brute fact should be taken to mean that a rule to delete the locative preposition which follows from must become more and more obligatory, as the PP becomes less and less spatial, is something which I at present do not know.]

Preposing rules

[I see the sequence of verbs which take from-phrases in (13) as a change from verbs in whose objects the PP is more important, being a part of the path constituent, to verbs in whose objects the NP which follows the from is more important, since it comes to be the Patient of the verb. Said in another way, the more motional a verb is, the more its Theme will be foregrounded, and the more its path backgrounded. As a backgrounded constituent, a path will tend to resist being broken up, will function as a unit. By contrast, the more privative a verb is, the less the object NP of its from-phrase should be glued to it, the freer it should be to move around in a clause, and the less it should insist on its from being with it on its peregrinations. For fronting a PP is emphasizing its adverbial roots, while fronting an NP out of a PP is cutting them.]

PP Fronting

- e. From the car I moved the rocks \geq ??From the car I cleared the
 ?*(to the house) snow.

[Here, the prediction seems to be confirmed, though it remains a mystery as to why the motional variant of (e) seems to require that its Goal-phrase be present in case there is a preposing operation, since there is no such requirement in non-preposed cases. There seems to be no way to save a preposed privative from-phrase from ungrammaticality, though.]

Topicalization

- f. ?The car I moved the rocks from. ≤ The car I cleared the snow from

[Here, for the NP-preposing operation of Topicalization, the proposed explanation seems confirmed.]

- g. From Tom I stole \$20.
g'. Tom I stole \$20 from.

[Here, the proposed explanation is totally disconfirmed – (g) should be significantly worse than (g'), yet I detect no difference whatsoever between them. I have no idea what causes (e) and (f) to be different from (g) and (g').]

Affectedness

- h. *What I did to the car was ≤ What I did to the walk was
to move the rocks from it. to clear the snow from it.

[If we make the assumption that pseudo-cleft sentences which have at their center a clause of the form X do something to Y will require that the Y be a patient, and that the verb which is the head of the focalized constituent after the copula contain a proform which refers to Y, where this proform is also a patient of the head verb, we see clearly the difference between the objects of motional from and privative from: only the latter is a patient of the verb, is affected by its action.]

Source Advancement

- i. *I moved the car of the rock. ≤ I cleared the walk of snow.
i'. I moved the rock from the car. I cleared the snow from the walk .

[We are not surprised that it is the patient of clear that can advance to become its direct object, thus chômeurizing snow, the Theme and deep object of clear. The reason that the object of a motional from, like the car in (i'), the putative source of the lefthand sentence in (i), cannot advance is that its primary "allegiance" is to the path of which it is a part. It is only related to the verb move derivatively: move takes a path as one of its arguments, and the car is merely a subconstituent of one of the legs of that path.]

IV.

What's in a place?

I think that it may prove helpful to try to look at what may be a minimal pair: two very basic senses of clear. The first is the almost purely motional one which is used in soccer and hockey, and the second is the kind of privative one that we have encountered above in examples (14e, f, h, i, i'):

- (15) a. The Bruins cleared the puck from their end of the rink.
b. The Bruins cleared the beer cans from their end of the rink.

For the purposes of this discussion, let us refer to the first of these as the “sports-clear,” and to the second as the “clean-clear.” There are at least the following differences that can be perceived between these two.

	<u>Sports</u>	<u>Clean</u>
a. Source	few restrictions (possibly the area must be seeable as being bounded?)	pretty much of a patient
b. Theme	focus of play (puck, ball)	any undesirable material
c. Path	few restrictions	perhaps limited to only the Source
d. Proforms for Source	[<u>there</u> preferred, <u>it</u> difficult, if at all possible]	[<u>it</u> preferred; <u>there</u> generally difficult, if at all possible]

Examples such as those to follow are the basis for the generalizations in (16). In the case of (16a), while I currently know of only sports like hockey and soccer which actually make use of clear to describe actions which characteristically happen in them, it seems to me that any similar sport or game which involves the temporary removal of objects of one kind or another from any kind of (probably necessarily bounded?) space would permit the usage of (16a) to be extended – cf. (17):

- (17) a. Billy cleared the marbles from his end of the bed to Jeffy’s end of the bed.
 b. The winning player in Intergalactic Planet Polo is the zblorg which can clear its opponent’s pkrctzes from its neutron mretches past the Supreme Arbiter’s neurocosmological throne to its opponent’s mretches in the smallest number of nanofpwerks.

By contrast, the clean-clear seems strange in contexts in which it is difficult to imagine the action of clearing having a permanent effect on the Source of the clearee’s movement. This seems to be the case for big Sources, like cities, countries, etc. (cf. (18a)), and for scattered examples like those in (18b,c), which I have no good characterization of:

- (18) a. ?It may take us a while to clear the snow from Boston,
 b. ?They want us to clear the canoes from the lake.
 c. ?I have already cleared the raindrops from the hood.

In the case of (16b), it is not hard to show that the sports-clear is only acceptable when its Theme is what I am calling the “focus of play” – cf. (19).

- (19) The Cruzeirenses cleared the ball / *the Atléticos from their half of the field.

With respect to the clean-clear, the necessity of the clearee being undesirable emerges from an inspection of the weird variants in (20):

- (20) a. You have to clear the weeds / ?!carrots from your garden.
b. Yes, Insta-Lime will quickly clear the pimples / !!! dimples from your cheeks.
c. Farmer Brown wants to clear the caterpillars / ?* apples from his orchard.

This last restriction on clear arises from a consideration of the semantics of the most basic form of clear, which I take to be adjectival uses having to do with light, and having a meaning involving that of "transparent," like those in (21):

- (21) a. The sky is clear (of (any) clouds).
b. The water is clear (of (any) mud).

The adjective clear contains an implicit negative, which accounts for the possibility of the polarity item any as a modifier of its object. Its meaning is only similar to that of transparent, for while this latter is a unary predicate, as witnessed by the fact that such sentences as those in (21) have no analogues like *(22),

- (22) a. The sky is transparent (*of (any) clouds).
b. The water is transparent (*of (any) mud).

clear is always implicitly a predicate of at least two places, the relation it describes being between a **light**, which is thematically a Source, and a **darkness**, which does not succeed in preventing the light from being perceived. This negation of success is the source of the any's of (22). I believe, in fact, that a deeper analysis of clear would hold it to be ternary, the third argument being for the Perceiver, a perceiver which cannot be expressed in non-metaphoric uses like those in (21), but which we see in such abstract extensions of clear as those in (23), where I have underlined the constituents whose role is that of this Perceiver.

- (23) a. The facts were clear to them.
b. That they were indignant was clear to us.
c. You will have to clarify your assumptions for me.

To return now to the sentences in (20), which launched this discussion of clear's deep arguments, the reason that the themes in (20) are always undesired is that they are always to be identified with the argument which expresses the **darkness** of the basic meaning of clear, which will always be present in examples like (15) and (20), for these represent a kind of causative. Thus a rough paraphrase of (15b) would be (24):

- (24) The Bruins caused their end of the rink to become clear of beer cans.

It is at present mysterious to me as to how to account for the semantactic (rough) equivalence between a semantically biclausal structure such as (24) and a

sentence like (15b), which contains a path. (15a) seems less puzzling – it has (25) as a rough paraphrase:

- (25) The Bruins caused the puck to go from their end of the rink (to someplace).

It may be that what (15b) and similar examples involve is another level of embedding, such as that suggested in (26a) or (26b):

- (26) a. The Bruins caused their end of the rink to go from having beer cans to not having beer cans.
 b. The Bruins caused their end of the rink to go from there being beer cans there to there not being beer cans there.

However, this is like explaining a riddle with an enigma, and is too speculative to be worth much. Let us return to the generalization in (16c), which is linked to the contrast between move and steal that I pointed out in (14a). There we saw that steal is ungrammatical with a Goal specified; (27) shows us that clean-clear also has difficulties with such a specification:

- (27) a. I cleared the snow from my driveway (?into my neighbor's yard).
 b. I cleared the snow from the front of my garden (?to the back of it).

To my ear, these examples are less impossible than is the steal-variant of (14a), but it seems to me that they are tending in the same direction. And Trajectories also seem hopeless:

- (28) a. I cleared the snow from my garden (*through the cellar window).
 b. I cleared the snow from my driveway (*past Officer Snodgrass).

Not all PP-objects of clean-clear sound perfect, though some seem fine. Adding directors appears to be in general dispreferred (cf. (29d, e)):

- (29) a. I cleared the snow from under the car.
 b. ? I cleared the snow from inside (??of) the trailer.
 c. ??I cleared the snow from by / near the shredder.
 d. I cleared the snow from (?back) under the car.
 e. I cleared the snow from (??out) behind the tree.

The tendency here is that commented on in (14a): the more florescent a path structure is, the more flamboyantly spatial, the less happy will clean-clear be to take it as its object.

Finally, let us look at the proforms which are found after the two clear's. We can use the quasi-minimal pair of (15) as our point of departure:

- (30) a. The Canadiens sent a long slapshot deep into the Bruins' end of the rink, but the Bruins cleared the puck from there /*it in the twinkling of an eye.
 b. The fans littered the Bruins' end of the rink badly, but the Bruins cleared the beer cans from it / there in a trice.

Let us expand our angle of vision slightly, to include a number of more metaphorical uses of clear. After each, I indicate the degree of grammaticality with which a from-version of the sentence would be greeted.

- (31) a. Sam cleared the table (?of (??a lot of) dishes).
 [from: OK]
 b. Moacyr cleared his throat (of the accumulated mucus).
 [from: ?]
 c. Judge Whitney cleared the courtroom (of spectators).
 [from: ?]
 d. Melanie cleared her agenda (*of committee meetings).
 [from: ?*]
 e. This treaty clears the way (**of obstructions) for disarmament.
 [from: **]

This list provides more of examples of the type of (14a). As we proceed from (31a) to (31e), we find fewer and fewer traces of the syntax of space, and correspondingly, greater and greater semantic abstraction. The reason that (31) is relevant in the present context is that it suggests the following principle:

(32) Travel Light

The more degenerate a path you cooccur with,
 the further you can go semantically.

This principle should probably be derivable from general principles of markedness; intuitively, it feels closely related to the fact, observed, I believe, by Joseph Greenberg, that unmarked phonemes have more allophones than do marked phonemes. Morphologically, masculines cover sets which contain both genders, while the more marked feminine can be used only for sets all of whose members are feminine. Etc., etc. I thus claim no particular originality for "Travel Light," except perhaps for the attempt to apply a markedness principle to the domain of metaphorical extension.

I return now to the question: how many from's? I think that this question may lack a discrete answer. I have formulated (32) in a gradient, or squishy, fashion, for I do not think that we are likely to be able to get by by saying that some from's are followed by locational NP's, while others are followed by Patients. I think that there is both more and less than a grain of truth in this – look, for instance, at the following sentences:

- (33) a. *What he did to the car was to move the snow from there. ≤
 b. ??What he did to the car was to move the snow from it.

- (34) a. ??What he did to the car was to clear the snow from there. ≤
 b. What he did to the car was to clear the snow from it.
 c. What he did to the car was to clear it of snow.

We see that when we use *it* instead of *there*, there is a *rise* in the paciency of the object of *from*, no matter how motional the verb is. I am only at the beginning of what promises to be a long and complex voyage into the mysteries of what language views as one of the many different kinds of “spaces” that it countenances, and thus uses (some part of) the machinery of the grammar of space to express, but as far as I can currently see, it is rare for there to be sharp lines between the spatial and the not – it is an area of pushes and pulls, of shadings and nuances, of negotiabilities. It is not a (very) binary place.



“I think there’s a personality that goes with this kind of thing,” Arthur says. “It’s people who like process and pattern, as opposed to people who are comfortable with stasis and order. I know that every time in my life that I’ve run across simple rules giving rise to emergent, complex messiness, I’ve just said, ‘Ah, isn’t that lovely!’ And I think that when other people run across it, they recoil.”

In about 1990, he says, at a time when he was still struggling to articulate his own vision of a dynamic, evolving economy, he happened to read a book by the geneticist Richard Lewontin. And he was struck by a passage in which Lewontin said that scientists come in two types. Scientists of the first type see the world as being basically in equilibrium. And if untidy forces sometimes push a system slightly out of equilibrium, then they feel the whole trick is to push it back again. Lewontin called these scientists “Platonists,” after the renowned Athenian philosopher who declared that the messy, imperfect objects we see about us are merely the reflections of perfect “archetypes.”

Scientists of the second type, however, see the world as a process of flow and change, with the same material constantly going around and around in endless combinations. Lewontin called these scientists “Heraclitians,” after the Ionian philosopher who passionately and poetically argued that the world is in a constant state of flux. Heraclitus, who lived nearly a century before Plato, is famous for observing that “Upon those who step into the same rivers flow other and yet other waters,” a statement that Plato himself paraphrased as “You can never step into the same river twice.”

“When I read what Lewontin said,” says Arthur, “it was a moment of revelation. That’s when it finally became clear to me what was going on. I thought to myself, ‘Yes! We’re finally beginning to recover from Newton.’” (Waldrop, pp. 334-335)

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