

Chapter 7

Force Dynamics in Language and Cognition

1 INTRODUCTION

A semantic category that has previously been neglected in linguistic study is that of **force dynamics**—how entities interact with respect to force. Included here is the exertion of force, resistance to such a force, the overcoming of such a resistance, blockage of the expression of force, removal of such blockage, and the like.¹

Though scarcely recognized before, force dynamics figures significantly in language structure. It is, first of all, a generalization over the traditional linguistic notion of “causative”: it analyzes ‘causing’ into finer primitives and sets it naturally within a framework that also includes ‘letting’, ‘hindering’, ‘helping’, and still further notions not normally considered in the same context.

Force dynamics, furthermore, plays a structuring role across a range of language levels. First, it has direct grammatical representation. In English, our main language of demonstration, such representation appears not only in subsets of conjunctions, prepositions, and other closed-class elements but, most significantly, also as the semantic category that most uniquely characterizes the grammatical category of modals as a whole, both in their basic and in their epistemic usages. Force-dynamic patterns are also incorporated in open-class lexical items and can be seen to bring many of these together into systematic relationships. Lexical items involved in this way refer not only to physical force interactions but, by metaphoric extension, also to psychological and social interactions, conceived in terms of psychosocial “pressures.” In addition, force-dynamic principles can be seen to operate in discourse, preeminently in directing patterns of argumentation, but also in guiding discourse expectations and their reversal.

Finally, the conceptual system for force interaction that appears to be built into language structure can be related to other cognitive domains. The linguistic system, in fact, shows close parallels with the conceptual systems for force interaction both in naive physics and psychology, and in early science, as well as in casual treatments of modern science—though it is often at variance with rigorous modern science. Overall, force dynamics thus emerges as a fundamental notional system that structures conceptual material pertaining to force interaction in a common way across a linguistic range: the physical, psychological, social, inferential, discourse, and mental-model domains of reference and conception.

In historical perspective, developed concepts of force interactions are of course not novel, in particular, for physical phenomena, long the study of disciplines like physics. Outside the physical, perhaps the most familiar application is that of Freud to the psyche, with such psychodynamic concepts as libido and drives, repression and resistance, id-superego conflict, and a tension-reduction model for restoring equilibrium. To my knowledge, however, systematic application of force concepts to the organization of meaning in language remained neglected until an initial endeavor in Talmy 1976a and, as an initial presentation as a basic linguistic system, in Talmy 1981. Earlier reference to force, of course, is to be found. Whorf (1941) cited and diagrammed force opposition as the referent of a particular Shawnee root, and the psychologist Fritz Heider (1958), whose work has recently come to my attention, discussed force concepts in modality. But these treatments were neither systematic nor explanatory. More recently, Gee and Kegl (1982:348–350) have developed a system involving forces to account for certain motion concepts in American Sign Language. Sweetser (1982, 1984), adopting the present force-dynamic framework, has carried it into an account of the epistemic senses of modals. Aspects of the present system have also been incorporated into the theoretical frameworks of Pinker (1989, 1997), Jackendoff (1990), and Brandt (1992).

The method I adopt here in investigating the category of force dynamics is based within the broader approach of cognitive semantics. This approach includes the idea that language uses certain fundamental notional categories to structure and organize meaning, but that it excludes other notional categories from this role. The included categories are most directly evident across languages as the categories of concepts that are expressed by closed-class forms—or, broadly speaking, by *grammar*—such as inflections and particles, as well as grammatical categories, rela-

tions, and constructions (see chapter I-1). Many of these same notional categories play a prominent role as well in structuring lexicalization patterns for open-class lexical items. To illustrate, many languages have noun inflections that indicate the *number* of the noun's referent, but they never have inflections that indicate this referent's *color*. From similar observations, we can construct two sets, one consisting of notional categories like 'color' that never appear in languages' closed-class forms, and the other of those that regularly do so and thus play a basic conceptual structuring role. In addition to number, this set will contain such generally recognized categories as aspect, mood, and evidentiality. One purpose of this study is to establish force dynamics as a further member of this privileged set of fundamental semantic categories. Beyond this, as cognitive scientist as well as linguist, I address the issue of how the semantic structuring evident within language relates to conceptual organization in other cognitive systems, such as the perceptual modalities and reasoning. In other work (Talmy 1983, 1987), I have compared the system that language uses to schematize and structure space and time, with properties of visual perception. Here, I will compare the way that linguistic force dynamics organizes conceptions of physics and psychology with the naive as well as the scientific mental models that we use to reason about these same areas.

The earlier outline of force-dynamic properties largely matches this chapter's sequencing, which steadily proceeds from more basic to more complex forms. First shown are the fundamental force-dynamic distinctions together with a system for diagramming them (sections 1 and 2). This leads to a demonstration of force dynamics as a generalization over the traditional causative (section 3). Next is shown how language extends physical force concepts to the expression of internal psychological interactions (section 4). This expansion allows us to bring together in a systematic pattern a number of lexical items that involve such psychodynamics (section 5). Language is then shown to further extend force-dynamic concepts to social interactions, and to organize lexical items with social reference in the same way as the psychological ones (section 6). The progression of parameters to that point permits an examination of the modal system in force-dynamic terms (section 7). Then a look at discourse shows how force-dynamic concepts extend, without augmentation, to the discourse factors that direct argumentation and to a familiar phenomenon here called *vector reversal* (section 8). The final text section (section 9) compares the conceptual models of physics and psychology that are built

into language in its force-dynamic system with comparable models in other cognitive domains. In the conclusion (section 10), further lines of research on force dynamics are sketched out, and the system is set within larger contexts, both that of other conceptual systems in language and that of human conceptual structure as a whole.

1.1 Illustrating the Category

Since force dynamics is a novel category in linguistics, it would be best to give it immediate illustration. The minimal pairs in (1) mostly contrast force-dynamically neutral expressions with ones that do exhibit force-dynamic patterns, showing these in a succession of semantic domains.

- (1) a. be VPing/keep VPing [physical]
 i. The ball was rolling along the green.
 ii. The ball kept (on) rolling along the green.
 b. not VP/can not VP [physical/psychological]
 i. John doesn't go out of the house.
 ii. John can't go out of the house.
 c. not VP/refrain from VPing [intrapsychological]
 i. He didn't close the door.
 ii. He refrained from closing the door.
 d. polite/civil [intrapsychological: lexicalized]
 i. She's polite to him.
 ii. She's civil to him.
 e. have (got) to VP/get to VP [sociopsychological]
 i. She's got to go to the park.
 ii. She gets to go to the park.

Illustrating the purely physical realm, (1ai) depicts a force-dynamically neutral event. The use of the word *keep* in (1a_{ii}), however, brings in either of two force-dynamic patterns: either the ball has a tendency toward rest that is being overcome by some external force acting on it, say, the wind, or the ball presently has a tendency toward motion that is in fact overcoming external opposition to it, say, from stiff grass.

In (1b) a psychological force factor joins the physical one. The force-dynamically neutral expression in (1bi) merely reports an objective observation, John's not going out. But (1b_{ii}), in addition to the same observation, also sets forth a full force-dynamic complex: that John *wants* to go out (conceivable as a forcelike tendency toward that act), that there is some kind of force or barrier opposing that tendency, and that the latter is stronger than the former, yielding a net resultant of no overt action.

Example (c) illustrates that language can depict a force opposition as wholly psychological, and in fact as occurring within a single psyche. Again, both (ci) and (cii) refer to the same overtly observable situation, an agent's nonaction. But (cii) in addition represents this situation as the resultant of an intrapsychological conflict, one between the agent's urge to act and the same agent's stronger inhibition against acting.

Example (d) exhibits the same type of force-dynamic contrast as (c) but demonstrates that this can be lexicalized. While the *polite* of (di) is neutral, (dii)'s *civil* indicates that the subject's basic tendency here is to be impolite but that she is successfully suppressing this tendency.

Example (e) demonstrates that language extends force-dynamic concepts as well to interpsychological—that is, social—interactions. Here, both of the expressions exhibit force-dynamic patterns, but of different types, ones that yield the same overt resultant for different reasons. In (ei), the subject's desire (= force tendency) is not to go to the playground, but this is opposed by an external authority who does want her to do so, and prevails. In (eii), the subject's desire *is* to go to the playground, and stronger external circumstances that would be able to block her from doing so are reported as either disappearing or not materializing, thus permitting realization of the subject's desire.

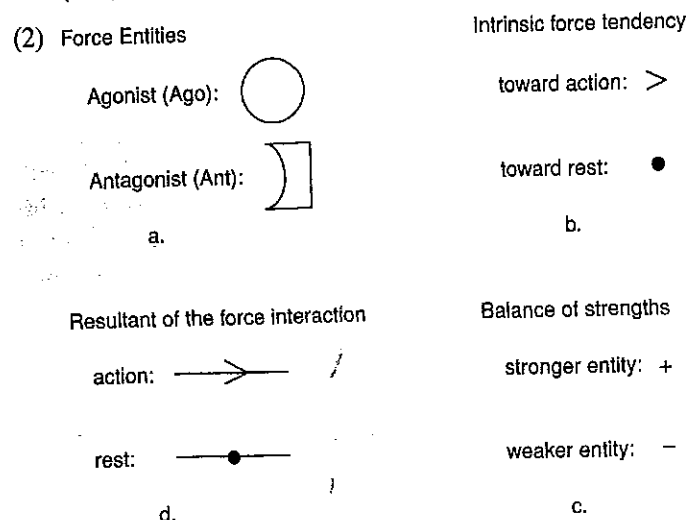
2 BASIC FORCE-DYNAMIC DISTINCTIONS

We begin the progression of force-dynamic parameters with the most fundamental—the ones that are operative throughout the system. In the present section, these are considered only for their application to the realm of physical force.

2.1 Steady-State Force-Dynamic Patterns

Underlying all more complex force-dynamic patterns is the steady-state opposition of two forces, and we now examine the factors that comprise it. The primary distinction that language marks here is a role difference between the two entities exerting the forces. One force-exerting entity is singled out for focal attention—the salient issue in the interaction is whether this entity is able to manifest its force tendency or, on the contrary, is overcome. The second force entity, correlatively, is considered for the effect that it has on the first, effectively overcoming it or not. Borrowing the terms from physiology where they refer to the opposing members of certain muscle pairs, I call the focal force entity the *Agonist* and the force element that opposes it the *Antagonist*.² In the system of

diagramming used throughout this chapter to represent force-dynamic patterns, the Agonist (Ago) will be indicated by a circle and the Antagonist (Ant) by a concave figure, as shown in (2a).



Note: Laterality is irrelevant—mirror-image diagrams represent the same force-dynamic pattern.

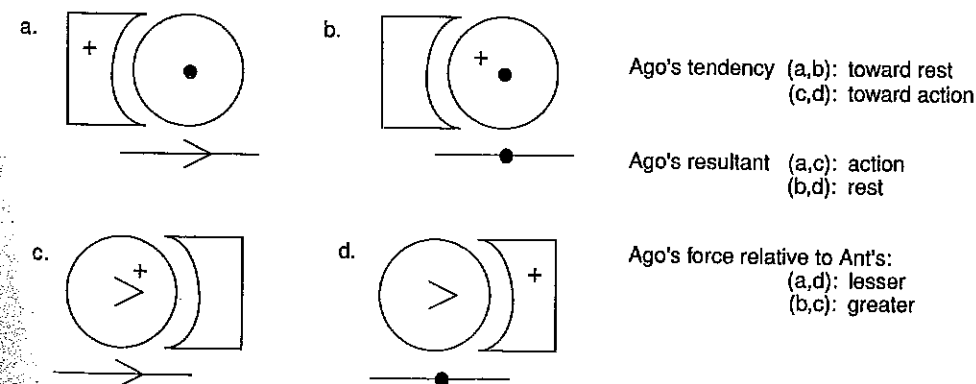
As language treats the concept, an entity is taken to exert a force by virtue of having an intrinsic tendency toward manifesting it—the force may be constant or temporary, but it is in any case not extrinsic. In an entity's force tendency, language again marks a two-way distinction: the tendency is either toward motion or toward rest—or, more generally, toward action or toward inaction. Diagrammatically, an Agonist's tendency toward action will be represented by an arrowhead and a tendency toward rest by a large dot, as seen in (2b), placed within the Agonist's circle. Unless needed for labeling purposes, no tendency marker is shown within the Antagonist symbol, since it is here understood to be opposite that of the Agonist.

A further concept in association with opposed forces is their relative strengths. As language treats this, the entity that is able to manifest its tendency at the expense of its opposer is the stronger. In the diagrams, a plus is placed in the stronger entity (and a minus, when necessary, can indicate the weaker entity), as in (2c). Finally, according to their relative strengths, the opposing force entities yield a resultant, an overt occurrence. As language schematizes it, this resultant is one either of action or

of inaction, and it is assessed solely for the Agonist, the entity whose circumstance is at issue. The resultant will be represented as a line beneath the Agonist, one bearing either an arrowhead for action or a large dot for inaction, as in (2d).

With these distinctions in hand, we are able to characterize the four most basic force-dynamic patterns, those involving steady-state opposition, as diagrammed and exemplified in (3). To describe these in turn, (3a) involves an Agonist with an intrinsic tendency toward rest that is being opposed from outside by a stronger Antagonist, which thus overcomes its resistance and forces it to move. This pattern is one of those to be classed as "causative," in particular involving the extended causation of motion. The sentence in (3a) illustrates this pattern with a ball that tends toward rest but that is kept in motion by the wind's greater power. In (3b), the Agonist still tends toward rest, but now it is stronger than the force opposing it, so it is able to manifest its tendency and remain in place. This pattern belongs to the "despite" category, in this case where the Agonist's stability prevails despite the Antagonist's force against it. In (3c), the Agonist's intrinsic tendency is now toward motion, and although there is an external force opposing it, the Agonist is stronger, so that its tendency becomes realized in resultant motion. This pattern, too, is of the "despite" type, here with the Antagonist as a *hindrance* to the Agonist's motion. Finally, in (3d), while the Agonist again has a tendency toward motion, the Antagonist is this time stronger and so effectively *blocks* it, rather than merely hindering it: the Agonist is kept in place. This pattern again represents a causative type, the extended causation of rest.³

(3) The basic steady-state force-dynamic patterns



- a. The ball kept rolling because of the wind blowing on it.
- b. The shed kept standing despite the gale wind blowing against it.
- c. The ball kept rolling despite the stiff grass.
- d. The log kept lying on the incline because of the ridge there.

Of these four basic force-dynamic patterns, each pair has a factor in common. As the diagrams are arranged in the matrix in (3), each line captures a commonality. In the top row, (a,b), the Agonist's intrinsic tendency is toward rest, while in the bottom row (c,d), it is toward action. In the left column, (a,c), the resultant of the force opposition for the Agonist is action, while in the right column, (b,d), it is rest. More significantly, the diagonal starting at top left, (a,d), which represents the cases where the Antagonist is stronger, captures the factor of extended causation. These are the cases in which the resultant state is *contrary* to the Agonist's intrinsic tendency, results *because of* the presence of the Antagonist, and would otherwise *not occur*. And the diagonal starting at top right, (b,c), which gives the cases where the Agonist is stronger, captures the "despite" factor. In fact the very concept of 'despite/although' can be characterized in terms of the common factor in this subset of force-dynamic patterns. Here, the resultant state is *the same* as that toward which the Agonist tends, results *despite* the presence of the Antagonist, and would otherwise *also occur*. Thus, the force-dynamic analysis so far captures certain basic general concepts—for example, 'despite' as counterposed to 'because of', as well as certain particular concepts, such as 'hindering' and 'blocking'. In doing so, an advantage of the present analysis becomes evident: it provides a framework in which a set of basic notions not usually considered related are brought together in a natural way that reveals their underlying character and actual affinity.

As the examples in (3) demonstrate, certain force-dynamic concepts have grammatical—that is, closed-class—representation. With the Agonist appearing as subject, the role of a stronger Antagonist can be expressed by the conjunction *because* or the prepositional expression *because of* (which in other languages often appears as a simple adposition), while the role of a weaker Antagonist can be expressed by the conjunction *although* or the preposition *despite*. Force-dynamic opposition in general can be expressed by the preposition *against*, as seen in (3b) or in such sentences as *She braced herself against the wind* / *They drove the ram*

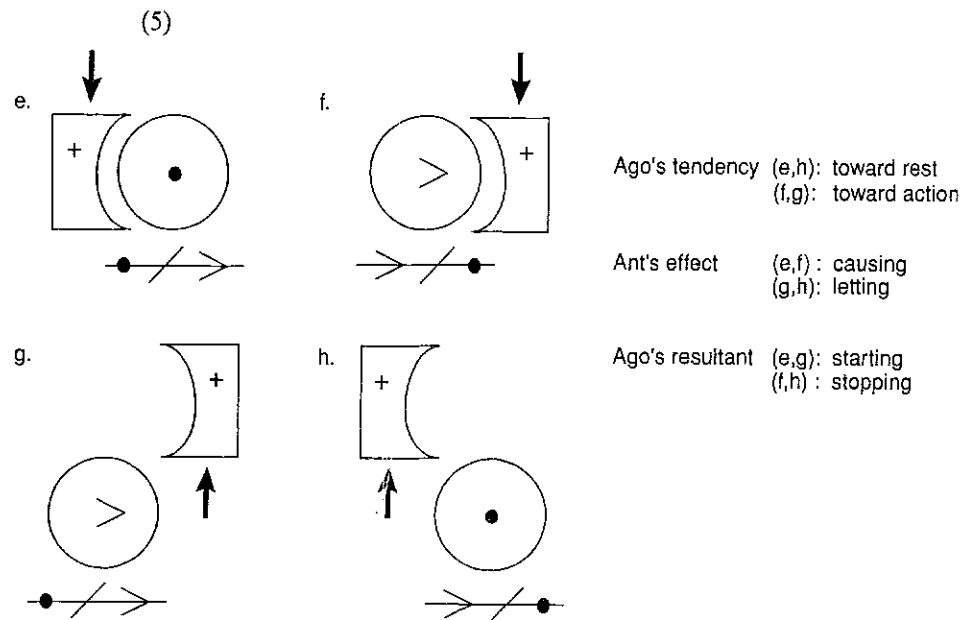
against the barricade. Perhaps the single form most indicative of the presence of force dynamics here is *keep -ing*. Technically, of course, this expression is not a closed-class form, since it is syntactically indistinguishable from any regular verb taking an *-ing* complement, such as *hate*. Nevertheless, its very frequency and basicness suggest for it a status as an "honorary" auxiliary, in the same way that *have to* can be taken as an honorary modal akin to the authentic *must*. Moreover, in the course of language change, *keep* is likelier than, say, *hate* to become grammaticalized, as its equivalents have done in other languages and much as *use to*, which stems from a syntactically regular verb, is now partially grammaticalized in its limitation to a single form. Whether *keep* is taken as closed-class or not, its force-dynamic role can be seen as well in other forms that are unimpeachably closed-class, such as the adverbial particle *still* and the verb satellite *on*, as illustrated in (4).

- (4) a. The ball kept rolling
 b. The ball was still rolling
 c. The ball rolled on
- } despite the stiff grass.

2.2 Shifting Force-Dynamic Patterns

At this point, another factor can be added—change through time—and with it, the steady-state force-dynamic patterns give rise to a set of change-of-state patterns.

2.2.1 Shift in State of Impingement In one type of changing pattern, the Antagonist, rather than impinging steadily on the Agonist, instead enters or leaves this state of impingement. The cases with a stronger Antagonist (based on (3a,d)) are the most recognizable and are considered first. As they are diagrammed in (5), these shifting patterns are not indicated with a sequence of static snapshots, but with the shorthand conventions of an arrow for the Antagonist's motion into or out of impingement, and a slash on the resultant line separating the before and after states of activity. These patterns are exemplified in (5) with sentences now taking the Antagonist as subject.



- e. The ball's hitting it made the lamp topple from the table.
 f. The water's dripping on it made the fire die down.
 g. The plug's coming loose let the water flow from the tank.
 h. The stirring rod's breaking let the particles settle.

To consider each in turn, the pattern in (5e) involves a stronger Antagonist that comes into position against an Agonist with an intrinsic tendency toward rest, and thus causes it to change from a state of rest to one of action. Thus, this is another pattern to be classed as causative, but this time it is the prototypical form, the type most often associated with the category of causation. If the two steady-state causative types, (3a,d), may be termed cases of **extended causation**, the present type can be called a case of **onset causation**, in particular, onset causation of motion. The pattern in (5f), correlatively, is that of onset causation of rest. In it, the stronger Antagonist comes into impingement against an Agonist that tends toward motion and has been moving, and thus stops it.

The four patterns that thus constitute the general causative category, (3a,d; 5e,f), have in common one property, absent from all other force-dynamic patterns, that emerges from force-dynamic analysis as definitional for the concept of causation. This property is that the Agonist's resultant state of activity is the opposite of its intrinsic actional tendency.

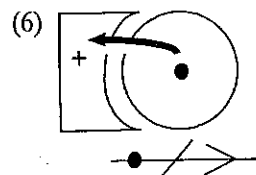
In the remaining patterns, these two activity values are the same. The force-dynamic interpretation is that an object has a natural force tendency and will manifest it unless overcome by either steady or onset impingement with a more forceful object from outside. This is a family of circumstances that language classes together under a single conceptual aegis, one that can appropriately be termed the "causative."

In the next pattern, (5g), the concept of 'letting' enters, and with it, further demonstration of the force-dynamic framework's power to bring together, in a systematic account, notions whose relatedness may not have previously been stressed. In (5g), a stronger Antagonist that has been blocking an Agonist with a tendency toward motion now disengages and releases the Agonist to manifest its tendency. This is the prototypical type of letting, onset letting of motion. In (5h), accordingly, is a nonprototypical type of letting, onset letting of rest, where an Antagonist that has forcibly kept in motion an Agonist tending toward rest now ceases impinging on this Agonist and allows it to come to rest. Where the category of causing was seen to depend on a notion of either the start or the continuation of impingement, the present 'letting' patterns involve the *cessation* of impingement.

As the shifting force-dynamic patterns are arrayed in (5), each line of the matrix again isolates a systematic factor. The diagonal starting at the top left, (e,h), holds as constant the Agonist's tendency toward rest, while the opposite diagonal, (f,g), does this for the tendency toward action. The top row, (e,f), indicates onset causation, while the bottom row, (g,h), indicates onset letting. And the left column, (e,g), represents the Agonist's starting into action, while the right column, (f,h), represents its stopping. The patterns as they are arrayed in columns thus serve to represent the category of force-related starting and stopping.⁴

2.2.2 Shift in Balance of Strength It was said at the beginning of this section that an Antagonist's entering or leaving impingement with the Agonist was only one type of shifting force-dynamic pattern. We can now outline another form. The Antagonist and Agonist can continue in mutual impingement, but the *balance* of forces can shift through the weakening or strengthening of one of the entities. For each impingement-shift pattern in (5), there is a corresponding balance-shift pattern. The correspondence can be understood this way: instead of a stronger Antagonist's arriving or leaving, to thus begin or end its overpowering effect, an Antagonist already in place can become stronger or weaker with the same

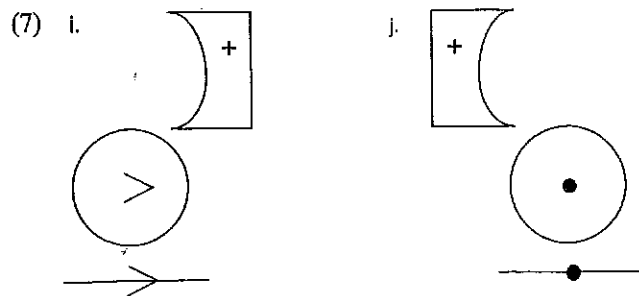
results. One of these patterns is selected for illustration in (6), with the arrow here indicating the shift in relatively greater strength (of course with no implication of any actual transfer of force from one entity to the other). In one of its usages, the word *overcome* represents this pattern and is shown exemplifying it.



The enemy overcame us as we stood defending the border.
[enemy = Ant, us = Ago]

2.3 Secondary Steady-State Force-Dynamic Patterns

The cases in (5) where the Antagonist moves away from the Agonist suggest further cases in which the Antagonist *remains* away. In fact, corresponding to each of the steady-state patterns in (3), with an Antagonist opposing an Agonist, is a secondary steady-state pattern with the Antagonist steadily disengaged. Where this Antagonist is stronger, we have the two patterns for 'extended letting'. Illustrated in (7i) is extended letting of motion and, in (7j), extended letting of rest. These together with the patterns for 'onset letting' seen in (5g,h) comprise the general category of 'letting'. It can now be seen that the major delineations within the overall causing/letting complex can be characterized in terms of types of impingement by a stronger Antagonist. Causing involves positive impingement: onset causing correlates with the start of impingement and extended causing with its continuation. Letting involves nonimpingement: onset letting correlates with the cessation of impingement and extended letting with its nonoccurrence.



- i. The plug's staying loose let the water drain from the tank.
- j. The fan's being broken let the smoke hang still in the chamber.

I have called the present group of steady-state patterns "secondary" because, it seems, they must be considered conceptually derivative, founded on a negation of the basic steady-state forms. The notions of Agonist and Antagonist, it can be argued, intrinsically involve the engagement of two bodies in an opposition of force, and reference to an Agonist and Antagonist not so engaged necessarily depends on their potential for such engagement. In Fillmore's (1982) terms, the disengaged cases presuppose the same semantic frame as the engaged cases.

2.4 The Relation of Agency to the Force-Dynamic Patterns

I should make clear why I have used for illustration, as in (5) and (7), sentences based on two clauses and without an agent, when linguists familiar with the causative literature are used to sentences like *I broke the vase*. The reason is that I regard such nonagentive forms as more basic than forms containing an agent. As argued in chapter I-8, the inclusion of an agent in a sentence, though often yielding a syntactically simpler construction, actually involves an additional semantic complex. An agent that intends the occurrence of a particular physical event, say, a vase's breaking, is necessarily involved in initiating a causal sequence leading to that event. This sequence must begin with a volitional act by the agent to move certain parts or all of his body. This in turn either leads directly to the intended event or sets off a further event chain, of whatever length, that leads to the intended event.

To represent a whole sequence of this sort, many languages permit expression merely of the agent and of the final event, like English in *I broke the vase*. Here, the sequence's remaining elements are left implicit with their most generic values (see chapter I-4). The next element that can be added by itself to the overt expression is the one leading directly to the final event—that is, the penultimate event, or else just its (so-called) instrument, as in *I broke the vase (by hitting it) with a ball*. This privileged pair of events, the penultimate and the final, forms the identifying core of the whole agentive sequence. It can in fact be excerpted from there for expression as a basic precursor-result sequence, as in *The ball's hitting it broke the vase*.

This is the basic sequence type of our illustrative sentences. In it, all the causal and other force-dynamic factors can be worked out in isolation,

and yet be known to hold as well when occurring within a larger sequence containing an agent. In this way, the sentences of (5) can be immediately associated with corresponding agentive sentences, as exemplified in (8), and there maintain all the same force-dynamic properties.

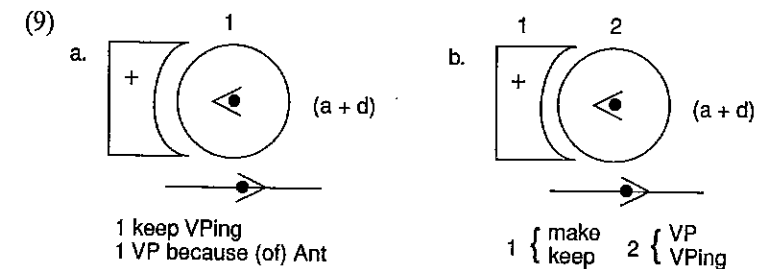
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|---|---|
| (8) <i>Autonomous</i> | <i>Agentive</i> |
| The ball's hitting it made the lamp topple. | I made the lamp topple by hitting it with the ball. |
| The plug's coming loose let the water flow out. | I let the water flow out by pulling the plug loose. |

2.5 Alternatives of Foregrounding in Force-Dynamic Patterns

All of the interrelated factors in any force-dynamic pattern are necessarily co-present wherever that pattern is involved. But a sentence expressing that pattern can pick out different subsets of the factors for explicit reference—leaving the remainder unmentioned—and to these factors it can assign different syntactic roles within alternative constructions. Generally, the factors that are explicitly referred to, and those expressed earlier in the sentence or higher in a case hierarchy, are more foregrounded—that is, have more attention directed to them. As with the agentive situation, those factors not explicitly mentioned are still implicitly present, but backgrounded.

With respect to representation, we can identify the explicit factors and their syntactic roles with a system of labeling on the force-dynamic diagrams. For this system, I borrow from Relational Grammar the use of 1 to indicate the element appearing as subject, and 2 for direct object. The label VP is placed beside the element that will be expressed as a verbal constituent. The particular syntactic character of this constituent can range widely, as we will see, so that the VP must be construed actually to designate a form of abstracted verb-phrasal base. An element not labeled is generally not represented explicitly in the construction. When labeled, a complete diagram thus represents a specific construction, usually one of sentential scope and with particular lexical inclusions. In addition, I use the following convention for capturing a commonality: where two patterns differ in only one factor—such as a tendency toward action versus a tendency toward rest—and also underlie the same construction, they can be represented in a single diagram with both values marked, for example, with both arrowhead and dot.⁶

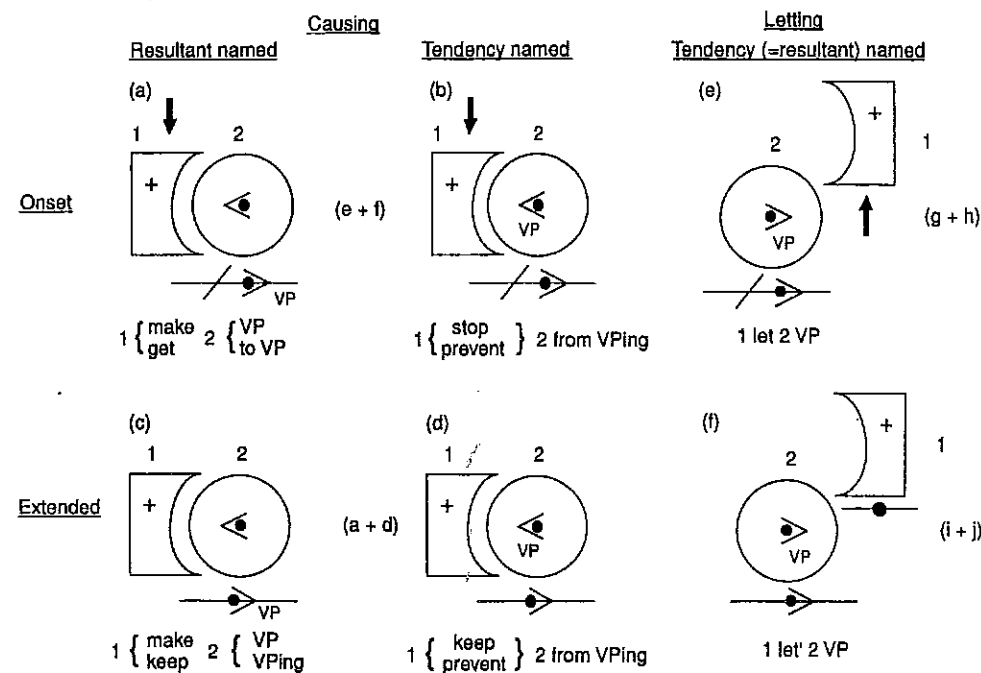
Turning now to actual cases, a difference in foregrounding due to syntactic role can be shown for the steady-state force-dynamic patterns of (3a,d), diagrammatically combined in (9). Familiar already from (3), the Agonist can be foregrounded by subject status, while the Antagonist is backgrounded either by omission or as an oblique constituent, as shown in (9a) with constructions involving intransitive *keep* or prepositional/conjunctive *because (of)*. Alternatively, the same force-dynamic patterns can be viewed with the reverse assignment of salience, where the Antagonist is foregrounded as subject and the Agonist backgrounded as the direct object, as shown in (9b) with constructions involving transitive *keep* or *make*.



- a. The ball kept rolling. / The ball is rolling because of the wind.
b. The wind kept the ball rolling. / The wind is making the ball roll.

The other main alternation in foregrounding pertains to the actional properties of a force-dynamic pattern. Either the Agonist's actional *resultant* can receive the main explicit representation in a construction, as in the cases seen so far, or its actional *tendency* can. Of course, this distinction in emphasis can apply only to causative patterns, since in these alone do the two actional values differ. The diagram in (10) brings together all the causing and letting patterns we have seen, here only with the Antagonist foregrounded, and the constructions that represent them. The new constructions are those in (b) and (d), which refer to the Agonist's *tendency* in causative patterns. Note that here the key force-dynamic word *keep* occurs again, but now in conjunction with *from* in a construction indicating 'prevention'. With these additions, the force-dynamic analysis relates still further linguistic phenomena within a single framework. (Note that examples for the (e) and (f) patterns appear in (7).)

(10)



The added soap (a) got the crust to come off. (b) stopped the crust from sticking.
 The shutting valve (a) made the gas stay inside. (b) stopped the gas from flowing out.
 The fan (c) kept the air moving. (d) kept the air from standing still.
 The brace (c) kept the logs lying there. (d) kept the logs from rolling down.

2.5.1 Asymmetry in the Expression of 'Make' Versus 'Let' English offers more syntactic options for the expression of 'making' than it does for 'letting'. For 'making', the Antagonist can be mentioned either by itself or along with the event in which it is involved, while 'letting' has only the latter option, as illustrated in (11a,b). This asymmetry continues when the 'making' and 'letting' patterns are embedded within an agentive matrix (as also noted by Jackendoff 1976), as seen in (11c,d). It is for this reason that in the 'letting' diagrams of (10e,f), the 1 indicating subjecthood was shown marking the Antagonist together with the Antagonist's activity.

- (11) a. i. The piston's pressing against it made the oil flow from the tank.
 ii. The piston made the oil flow from the tank.
 b. i. The plug's coming loose let the oil flow from the tank.
 ii. *The plug let the oil flow from the tank.

- c. i. I made the oil flow from the tank by pressing the piston against it.
 ii. I made the oil flow from the tank with the piston.
 d. i. I let the oil flow from the tank by loosening the plug.
 ii. *I let the oil flow from the tank with (*of/*from) the plug.

The explanation for this asymmetry may lie in a language-universal treatment of 'instrument' as involving only positive impingement. For supporting evidence, note that in talking about causing a stacked display of cans to topple, an instrumental *with*-phrase as in (12) can refer either to the beginning of impingement (12a) or to its continuation (12b), but not to its cessation (12c). And there is no other phrasal indication for such a reverse instrument, as seen in (13).

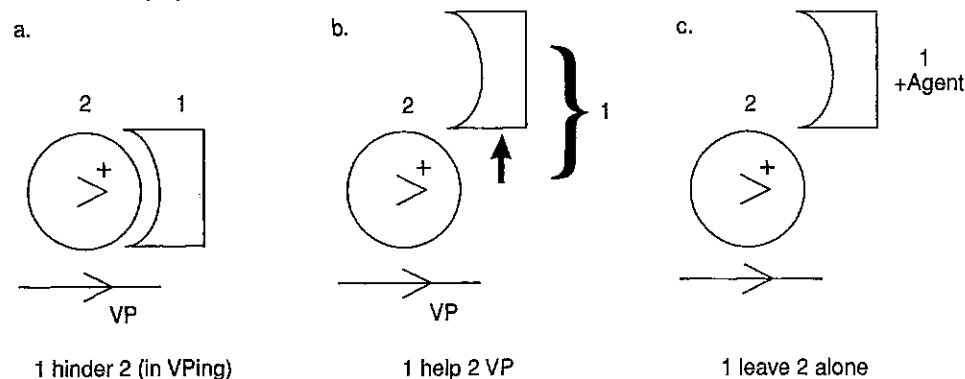
- (12) I toppled the display *with a can*—covers:
 a. ... by throwing a can at it.
 b. ... by pressing against it with a can.
 c. *... by pulling a can out from the bottom tier.

- (13) *I toppled the display *from/off* ... a can.

2.6 Force-Dynamic Patterns with a Weaker Antagonist

Since our initial look at the basic steady-state patterns, all the force-dynamic patterns dealt with have had a stronger Antagonist. But the present framework allows for a set of eight patterns with weaker Antagonist. These are the two steady-state patterns in (3b,c) with the Antagonist impinging against the Agonist, and correspondingly: two with this Antagonist coming into impingement, another two with the Antagonist leaving impingement, and a final two with the Antagonist remaining out of impingement. As a set, these patterns seem to play a lesser role than the set with stronger Antagonist, but certain patterns among them are nevertheless well represented in English. This is certainly the case for the earlier-discussed 'despite/although' formulations, where the Agonist appears as subject. In addition, for cases with the Antagonist as subject, (14) shows patterns with the Antagonist (a) engaged (the same as the steady-state (3c) pattern, now labeled), (b) disengaging, and (c) steadily disengaged, where these underlie constructions with *hinder*, *help*, and *leave alone*, respectively.

(14)



- Mounds of earth hindered the logs in rolling down the slope. / The benches hindered the marchers in crossing the plaza.
- Smoothing the earth helped the logs roll down the slope. / Removing the benches helped the marchers cross the plaza.
- I left the rolling logs alone. / The police left the marchers alone in their exit from the plaza.

It is significant that the lexical verb *help* should be found in a force-dynamic context. As illustrated in (15), there are four transitive verbs in English that take an infinitive complement without *to*, namely, *make*, *let*, *have*, and *help* (i.e., outside of perception verbs, which form a separate class in also taking an *-ing* complement). We have already seen *make* and *let* figure deeply in the expression of basic force-dynamic patterns. *Have* is also force dynamic, expressing indirect causation either without an intermediate volitional entity, as in *I had the logs roll down the south slope*, or, as is usual, with such an entity: *I had the boy roll the log along*. And now we find *help* also with force-dynamic usage. The significance of this is that a syntactically definable category can be associated with a semantically characterizable category, thus lending relevance to both and support to the idea of structural integration in language. More will be made of this cross-level association of categories in the discussion of modals.

(15) I made/let/had/helped the logs roll along the ground.

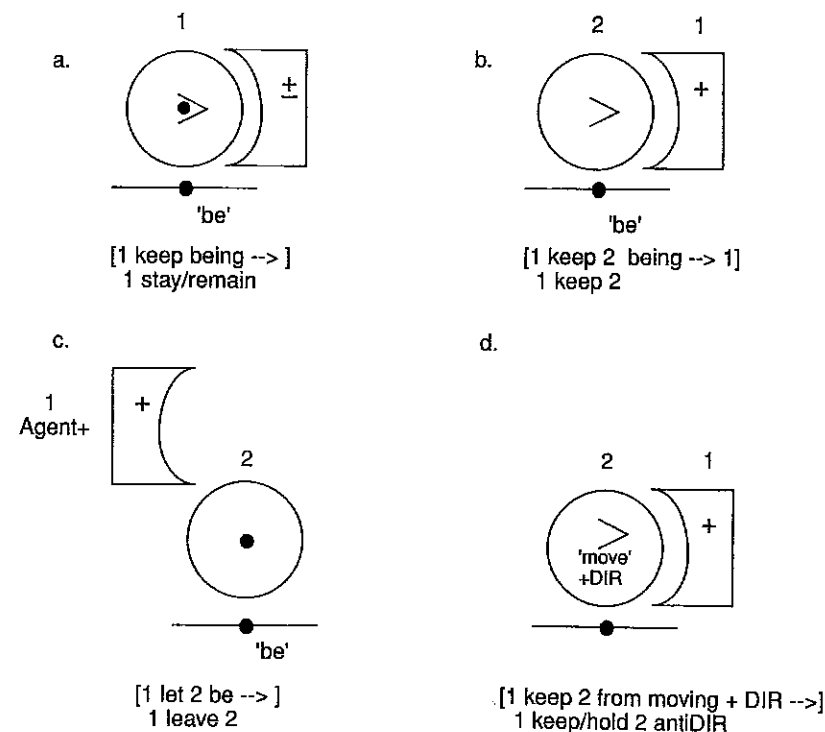
2.7 Particularized Factors in Force-Dynamic Patterns

In every force-dynamic pattern treated so far, the component factors have been at their most generic. Any element or event with the minimal requisite property called for by a factor can instantiate that factor and, accordingly, be expressed in the construction that represents the pattern. But this

system has an extension. Constructions exist that correspond to a force-dynamic pattern in which a particular factor has a specific identity. Where this identity involves a basic notion, say, where a pattern's VP factor is particularized as 'be' or 'move', the corresponding construction generally also includes some basic lexical item. In this way, we find more of the core lexicon and syntax brought under the force-dynamic aegis.

Thus, we find such prominent English lexical verbs as *stay/remain*, *leave*, *hold*, and, once again, *keep*, arising from the particularized patterns shown in (16). The depicted correspondences preserve certain syntactic properties as well. Thus, *be*, which particularizes the VP in the (16a,b,c) patterns, can normally occur with a nominal, an adjective, or a locative, as in *He was a doctor/rich/in Miami*. The same is true of the verbs in the corresponding constructions, as in *He remained a doctor/rich/in Miami*, *Events kept/left him a doctor/rich/in Miami*. In (16d), the *DIR* (Directional) element accompanying 'move' has been left generic. But if it, too, is particularized, say, as 'down' or 'out', then the pattern yields still further constructions. Thus, beside *1 keep 2 from moving down/out* is not only *1 hold 2 up/in*, but further *1 support 2* and *1 confine 2*.

(16)



- a. [The log kept being on the incline (because of the ridge there).
→]
The log stayed on the incline (because of the ridge there).
(tendency: >; Ant: +)
[The shed kept being on its foundation (despite the gale wind).
→]
The shed remained on its foundation (despite the gale wind).
(tendency: •; Ant: -)
- b. [The ridge kept the log being on the incline. →]
The ridge kept the log on the incline.
- c. [Let the cake be (keep being) in the box! →]
Leave the cake in the box!
- d. [The ridge kept the log from moving ahead. →]
The ridge held the log back.

3 FORCE DYNAMICS AS A GENERALIZATION OVER "CAUSATIVE"

Given this survey of the basic force-dynamic patterns and their linguistic expression, we are now in a position to view the whole system for its properties as an integrated framework. One main understanding that emerges is that force dynamics is a generalization over the traditional notion of "causative" in the linguistic literature. That tradition itself has a progression of treatments. The earlier ones, such as in McCawley 1968, abstracted an atomic and uniform notion of causation, often represented as "CAUSE," that countenanced no variants. Later treatments, such as those of Shibatani (1973) and Jackendoff (1976), perceived a finer complex of factors. Talmy (1976b, 1985b) has distinguished at least the following: resulting-event causation, causing-event causation, instrument causation, author causation, agent causation, self-agency, and inductive causation (caused agency). But even these treatments did not analyze far enough. While they revealed the factors that go into more complex forms of causativity, these were all still founded upon the same, unanalyzed notion of primitive causation. With the force-dynamic framework, now this too gives way. What had been viewed as an irreducible concept is now seen as a complex built up of novel primitive concepts. And because these finer primitives recombine in a system of different patterns, the idea of causation is now seen as just one notion within a related set.

I can now detail the generalization. First, the force-dynamic analysis provides a framework that accommodates, among the patterns with a stronger Antagonist, not only 'causing', but also 'letting'. Further, it

accommodates not only the prototypical forms of these, but also the nonprototypical, in the sense in which Lakoff (1987) characterizes prototypicality for a conceptual category. Thus, it accommodates not only the prototypical type of causing, 'onset causing of action', which all accounts treat, but also 'onset causing of rest'. The previous neglect of this latter pattern is evident in the very terminology that had been selected. Thus, Shibatani's (1973) term most closely corresponding to the present "onset" is "ballistic causation," a term that could never have been meant also to include causing to come to rest (see chapter I-8); "beginning-point causation" fares a bit better in this regard. The nonprototypical pattern 'extended causing of action' has had some prior recognition—for example, with Shibatani's "controlled causation" or my earlier "extent causation." But neither of these authors had envisioned the correlative pattern, 'extended causing of rest'. As for 'letting', this notion has in most treatments gone unmentioned beside discussion of causing. If mentioned, it is generally the prototypical type, 'onset letting of action', that is treated. Though Talmy (1976b) and Jackendoff (1976) did include analysis of several further types, it has remained for the present force-dynamic analysis to provide an adequate matrix for the inclusion of 'onset letting of rest' and 'extended letting of action/rest'.

The next major generalization in the force-dynamic framework is that it classes both causing and letting together as cases involving a stronger Antagonist and then counterposes to these the cases with a weaker Antagonist. This larger picture now contains a set of notions not normally considered in the same context with causation. Included among them are the general notions of 'despite' and 'although', and such particular notions as 'hindering', 'helping', 'leaving alone', and, as we will see below, 'trying'.

Finally, with the idea of alternative foregrounding, the force-dynamic framework is able to capture the concept not only of the causing of a result, but also of the *prevention* of a *tendency* (a factor also noted below for modals, in alternations of the type *He must go.* / *He may not stay.*). The provision for alternatives of foregrounding, furthermore, permits treating not only constructions with the affecting entity (the Antagonist) as subject. It also brings in on a par constructions with the affected entity (the Agonist) as subject and even as the only-mentioned participant, as with intransitive *keep* (and all modals, as seen below).⁶

The set of the force-dynamic framework's generalizations can be summed up as in (17). The important point to make here is that force dynamics does not simply *add* cases; rather, it *replaces* an earlier limited