Force Dynamics in Language and Cognition

Another important dynamical perspective on sentence semantics was proposed in more recent times by Leonard Talmy in a seminal paper which appeared in the journal *Cognitive Science* (Vol. 12, 1988). There is, however, a major difference between Talmy's approach based in 'force dynamics' (FD) and the two approaches discussed earlier: the Catastrophe Theoretic (CT) Semantics and the Karaka theory (Lectures 2 and 3). And this lies in the fact that Talmy's starting point of his investigation is the 'closed class' (as opposed to the 'open' class of lexical items) grammatical categories on the form side, and the notion of 'causativity' on the content side. As we have already seen, the latter are concerned with providing a actantial-dynamical interpretation for the case-structures (including adpositions), though each in its own way.

Talmy's basic objective is to identify certain 'conceptual structures' in language that are in general parallel to the structuring mechanisms in other cognitive domains such as visual perception. The idea that grammars are not autonomous, but function as conceptual organizing systems is something that he shares with many other practitioners of Cognitive Linguistics / Semantics, particularly Ron Langacker, Bernard Pottier, Ray Jackendoff, George Lakoff, Mark Johnson and Eve Sweetser. In an earlier paper, "The Relation of Grammar to Cognition" (we shall refer to the 1988 version), Talmy had identified (and discussed the first three of the) four 'imaging systems' implicit in language, that are employed for organizing conceptual material. These are the imaging systems for (i) structural schematization, (ii) deployment of perspective, (iii) distribution of attention, and (iv) force dynamics. Broadly, this paper focused on the role of the

'closed' class of grammatical elements in the structuring of sentence semantics, that is, on the semantics of syntax. The semantic continuum we had discussed in Lecture 1 is, in Talmy's own version of it, populated by the elements of "two subsystems (that) have distinct semantic functions, ones that are indispensable and complementary." Talmy tells us:

'…we take a sentence (or other portion of discourse) to evoke in the listener a particular experiential complex, here to be termed a "cognitive representation" or CR. Now the grammatical and lexical subsystems in a sentence seem generally to specify different portions of a CR. Together, the grammatical elements of a sentence determine the majority of the structure of the CR, while the lexical elements together contribute to the majority of the content.' (Talmy, 1988a:165)

The first three of the 'imaging systems' are directly involved in the organization of space and time in language: i. 'structural schematization' refers to the pattern of inter-relationship of two or more entities / events on a referent space; ii. 'deployment of perspective' refers to the placement — static or dynamic — of one's 'mental eyes' upon a referent scene in space or time; and iii. 'distribution of attention' refers to differential allocation of attention upon the entities on a referent scene. In all these cases the entities on the referent space are relatively static. While the fourth imaging system, or 'force dynamics' is concerned with the dynamic interaction between entities on a referent space. Apart from the exertion of force by one entity upon another, Talmy considers under this category further notions, such as resistance to force, overcoming of resistance, blockage to force exertion, and removal of blockage. In short, the FD patterns that Talmy discovers in sentence structures seem are more akin to a system of

Agonistics that analysts like V. Propp and A.-J. Greimas had identified for the structures of narrative.

Talmy's *Cognitive Science* paper which contains a detailed discussion on FD, describes the latter as a 'neglected semantic category' and as a 'fundamental notional system that structures conceptual material pertaining to force interaction…' It is true that while we can get copious accounts by linguists, psychologists and philosophers on the existence of the categories of 'space' and 'time' within linguistic and cognitive structures, we hardly find any serious discussion of 'force' as a general descriptive category in the non-physical domains. (The agonistics of the narrative structures could be a useful exception in this respect.) The nearest we find in traditional grammars are those of diathesis (active / passive) and of its close relation the 'causative' category. Talmy's FD category is purported to be a 'generalization' over the causative, since an expanded notion of 'causing' (i.e., force exertion) as well as related notions such as 'letting' (removal of blockage), 'hindering', blocking, and 'helping' can be included within the framework of this category. The paper is rich in demonstrative examples drawn from American English. Consideration is not limited to the grammatical elements. In addition to the grammatical elements like the modals, the FD patterns are shown to be associated with a broader class that also includes a restricted set of lexical elements claimed to represent a more general causative category. Talmy has employed a system of diagrams to illustrate his FD patterns. (The diagrams for the first set of sentences, 1a-1d below, are given in the Appendix. Readers are advised to see the diagrams for other sentences in Talmy 1988b.) With the aid of these diagrams, he identifies a system of binary oppositional values possessed by the interacting entities:

Firstly, the interacting ('force') entities may be either an Agonist (Ago) or an Antagonist (Ant). The Agonist is the entity that receives focal attention, and

the Antagonist is that which opposes the force of the Agonist. (Talmy uses a circle for the Agonist and a concave trapezoid figure for the Antagonist.)

Secondly, the force entities are conceptualized as having contrary intrinsic force tendencies, i.e., either towards action ( ) or towards rest ( ).

Thirdly, they are conceptualized as being relatively strong (+) or weak (−).

And fourthly, the resultant of the force interaction can either be action (->-) or rest (− −).

We present the first set of examples:

1a. CAUSING: The ball kept rolling because of wind blowing on it.
1b. RESISTING: The shed kept standing despite the gale wind blowing in it.
1 c. OVERCOMING: The ball kept rolling despite the stiff grass.
1d. BLOCKING: The log kept lying on the incline because of the ridge there.

In these examples, the Agonists are the 'ball', the 'shed', the 'ball' and the 'log' respectively; of these the 'shed' and the 'ball' (in 1c.) are relatively stronger (+) than the corresponding Antagonists. The 'ball' (in 1a.) and the 'shed' have intrinsic force tendency towards rest, while the 'ball' (in c.) and the 'log' have intrinsic force tendency towards action. The Antagonists are the 'wind', the 'gale wind', the 'stiff grass', and the 'ridge' respectively; of these the 'wind' and the 'ridge' are relatively stronger than the corresponding Agonists. The resultant of the force interaction is: action in 1a. and 1c., and rest in 1b. and 1c.

The next set of examples, referred to as 'shifting FD patterns' involve change through time. Here, in the place of conjunctive elements like 'because of' and 'despite' as in (1) appear the finite verbs 'to make' (= causing / force exertion) and 'to let' (= removal of blockage).

2a. The ball's hitting it made the lamp topple from the table.
2b. The water's dripping on it made the fire die down.
2c. The plug's coming loose let the water flow from the tank.
2d. The stirring rod's breaking let the particles settle.

Talmy notes that 2a. and 2b. are the prototypical cases of the 'causative' because they involve the 'onset' causation of action or rest respectively. While 1a. and 1b. are less prototypical, involving 'extended' causations. For these four FD patterns the resultant state of activity is the opposite of the intrinsic force tendency. In the examples with 'let' (2c. and 2d.) and in 1b. and 1d., the resultants and the intrinsic tendencies are the same. Further, the following examples are for 'extended letting'(of action and of rest respectively):

3a. The plug's staying loose let the water drain from the tank.
3b. The fan's being broken let the smoke hang still in the room.

Thus these examples suggest a broader configuration of FD patterns around the traditional 'causative'. Not only are 'causing' and 'letting' are usefully distinguished, but related to the 'onset causing of action' (the causative proper), we find 'onset causing of rest', 'extended causing of action', 'extended causing of rest', and related to 'onset letting of action' there are: 'onset letting of rest', 'extended letting of action' and 'extended letting of rest.'

From his consideration of the relationship between causativity and agentivity, it seems that Talmy eschews the issue of case- structures altogether. This issue, we have seen is central for the approaches we have presented in the two previous lectures. Talmy thinks that the FD patterns expressed in sentences 2a and 2b, with their precursor-resultant sequences are semantically more basic than an agentive / accusative + instrumental sentence like 'I toppled the lamp by hitting it with a ball'. Talmy's subordination of the actantially-based and grammatically relevant case-category to the causatively-oriented FD semantic patterns is not entirely convincing. What is most relevant is to provide a simultaneously syntactic and semantic account of the grammatical cases.

It is noted that verbs like 'hindering', 'helping', and 'leave alone' involve a weaker Antagonist. These patterns form a finer- grained set located conceptually between the steady-state FD patterns of blockage, and removal of blockage. In 'hindering' a stronger Agonist is obstructed in its action tendency by a weaker Antagonist (e.g., 'The benches hindered the marchers from crossing the plaza'). In 'helping' the weaker Antagonist is being 'disengaged' from its interaction with the stronger Agonist (e.g., 'Removing the benches helped the marchers'). And in 'leave alone' the weaker Antagonist is completely disengaged from its interaction (e.g. 'The police left the marchers alone').

Talmy's identification of certain FD patterns as part of 'linguistic psychodynamics' and 'sociodynamics' is particularly interesting. He regards 'wanting', 'refraining' etc. as instances of psychodynamics associated with seeking / suppressing the manifestation of an inherent actional tendency. E.g., in 'He wants to open the window' there is a "psychological 'pressure', 'pushing' (the subject) towards the realization of some act or state." Language conceptualizes the self as divided into two equivalent parts: there's the Agonist standing for the self's inner psychological tendencies

such as desire, or inertia, as well as the Antagonist functioning as a blockage or suppression for the desires, or as a spur. In this scheme, the self is divided horizontally, with the desiring part as the central and the blocking / spurring part as the peripheral. We have as examples:

4a. He refrained from responding.
4b. He forced / brought himself to speak.

Further, it is suggested that many of the FD properties in 'sentient' beings may have come from underlying psychological FD. For demonstration we have the following comparison:

5a. The new dam resisted the pressure of the water behind it.
5b. The man resisted the pressure of the crowd behind him.

Here the intra-subjective opposition is seen as one between a 'goal-oriented' psychological part and a 'repose-oriented' physical part. In language conceptualization, Talmy claims that "the physical part of a sentient entity (is) essentially inert, requiring animation by the psychological aspect."

We can systematize these notions in the following way:

A. For Intra-psychological FD:

Central part = Agonist = Desiring (In Freudian terms this corresponds to the 'Id').
Peripheral part = Antagonist = Blocking or Spurring (Freudian 'Superego').

B. FD in sentient entities:

Physical part = Agonist = repose-oriented.
Psychological part = Antagonist = goal-oriented.

Thus in relation to external entities (B) the body is conceptualized essentially as repose-oriented, considered as the Agonist, needing to be animated by the psychological, goal- oriented Antagonist. The fact that psychological force is otherwise deemed as the 'inner' does not prevent it from being the Antagonist in this interaction. But, in (A) it is the psychologically-internalized body societal values (the superego) which becomes 'peripheral' force entity or the Antagonist, blocking or spurring the central force entity or the Agonist which is also the desiring entity.

These FD patterns which involving a Subject VP Self type of structure can be considered as part of the more general of metaphorical representation of the self in ordinary language. Under the rubric of 'divided self' metaphors, G. Lakoff has identified a subcategory of 'loss of self' metaphors. Self is often conceptualized as a possession of the Subject. Self-control (in FD terms, desire of the weaker self, the Agonist, and its blocking by the stronger self, the Antagonist) is the possession of the Self by the Subject. And loss of self-control is the loss of this possession (in FD terms, the desire of the stronger self being 'left alone' by a weaker

Antagonist. Talmy considers the expressions of social obligations and requirements in relation to certain natural tendencies as aspects 'sociodynamics'. They involve expressions like 'push', and 'pressure', and 'urge'. The examples are:

6a. He is under a lot of pressure to keep silent.
6b. The gang pushed him to do things he didn't want to.
6c. She urged him to leave.

It is noted that sociodynamics of this sort essentially take place through communication. While the actually observable FDs are similar to those in psychodynamics, in this case, one has also to account for the fact that force exertion is taking place through the a communication medium. In Talmy's diagrams this additional communicative factor of sociodynamics with its associated two-way directionality is appropriately indicated, by way of distinct force exertion labels attached to the Agonist and Antagonist entities.

The set of grammatical elements, broadly referred to as 'modals' is central for Talmy's project in being a 'closed class' category having force dynamics interpretation. Classical philosophical interpretations of modality, as in the grammar of Port-Royal, or in Kant's Critique of Pure Reason considered only its epistemic value. But in language use, the modal elements have in addition, a 'deontic' (Gk. 'deon' = duty) use, which linguists, in fact, view as the basic meaning. In Talmy's scheme, several English modals in their deontic use in combination with the negative particle 'not' have meanings easily compatible with expressions indicating sociodynamics as described above. For example, can + not indicates a force interaction where a weaker

Agonist- Subject's tendency toward action is opposed by a stronger unmentioned / implicit Antagonist's opposing tendency. E.g.,

7a. John can not leave the house.

The similar modal + not constructions yields related meanings:

May + not -> the Subject's desires to manifest an actional tendency is blocked by an authority's denied permission.

Similarly, must/had better + not -> active social contra-pressure on the Subject. need + not -> Subject's freedom from social obligation. Etc.

The modal FD patterns is effectively exemplified by the following formula:

7b. John can/may/must/should/ought/would/need/dare/had better not leave the house.

Eve Sweetser in her account of the 'Root' and 'Epistemic' senses of modal verbs claims that the latter have emerged diachronically via the metaphorical extensions of the former. In other words, the modal categories (possibility, necessity and existence) which have been accorded a prime place in our rational structure, and which Kant had elevated to the status of

logical categories, are in Sweetser's view the result of metaphorization of sociophysical force dynamics patterns. She demonstrates that the three related domains experience where the modal verbs figure, namely, the sociophysical, the epistemic, and the discourse structure are connected by a coherent system of metaphors. According to her, the phenomenon of such metaphorical extensions is quite understandable since "we generally use the language of the external world to apply to the internal mental world, which is metaphorically structured as parallel to that external world" (Sweetser, 1990: 50). Her examples are:

For root senses: *8a. You must move your foot, or the car will crush it. (indicating physical necessity; = in FD terms, a compelling force that moves a subject towards an act.)*
8b. Sally can reach the fried eel for you. (physical capability; = absence of restricting force barriers with focus on potentiality or capacity to act.)
8c. Paul must get a job now, or else his wife will leave him. (social necessity?)
8d. You may now kiss the bride. (social permission; = absence of external or internal restrain or compulsion.)

For epistemic senses: *9a. Paul must have gotten the job, or else he couldn't be buying that new car. (epistemic necessity; = available evidence compels one to rationally conclude something.)*
9b. You might be right about her motives, but I am not convinced. (epistemic possibility; = absence of barrier to rationally conclude something on the basis of the available premises.)

Talmy goes on to show the utility of the FD notion in the pragmatics of discourse, especially in the context of 'argumentation'. Points of argument

can be used to reinforce each other to persuade a potential ally, or to counter an adversary's previous argument. Talmy assigns a force-dynamic value to certain discourse-markers that 'direct the illocutionary flow' in a argumentation. These are (in English): yes but, besides, nevertheless, moreover, granted, instead, all the more so, whereas, on the contradictory, after all, even so, okay, and well.

10. A: You know, I think Eric should sing at a recital — he has a beautiful voice.
B: Yes, but he can't stay on key.

Here the initial direction of illocutionary flow characterized by A's argument that Eric has a beautiful is blocked by the introduction of B's argument that he can't stay on key.

Mark Johnson (1987) has sought to extend the FD notion to the structure of speech acts proposed initially by the British philosopher, J.L.Austin, and developed further by John Searle. Johnson notes that even in Austin's original formulation the 'performative' utterances were taken to be a kind of action, having a 'force' instead of only a meaning as it was in the case of the 'constatives'. The three forces that Austin had identified are: the locutionary force (the mode in which a speaker presents utterance, including its phonetic form), the illocutionary force (which determines the particular uptake of the utterance — as command, request, question, etc. — by the hearer), and the perlocutionary force (the 'effects' — happiness, sadness, etc. – – that the utterance has on the hearer). Searle had proposed the following simple formula for the speech acts:

F (p)
where 'p' is the propositional content of the utterance, and F is the
illocutionary force.

Johnson suggests a modification of this original speech act schema by resorting to Michael Reddy's idea of 'conduit metaphor'. The 'conduit metaphor' that Reddy identified initially in the context of English language, functions there as a kind of paradigm metaphor for the domain of communication / language. The conduit metaphor is what a majority of the speakers of English language (and possibly of many other languages) employ ordinarily to describe the domain of communication. This metaphor consists of the following taken for granted or unreflected notions:

a. ideas / thoughts / emotions are objects;
b. linguistic units like words and sentences are containers for these objects;
c. in communication, the speaker sends the idea /emotion- container through an appropriate medium to the listener;
d. the listener unpacks the container to get the idea/emotion.

As per Johnson's reformulation: the locutionary force is that which acts on the sentence-container (in the sense of Reddy), determining the 'shape' of the container. It is this force that is responsible for the specific form of a speech act like an question, and makes it different from an assertion or a command; illocutionary force of an utterance determines the specific uptake it induces in the listener: by changing her information- structure for an assertion, by supplying relevant information for a question, or by acting in a desired manner for a command or a question, etc.; the perlocutionary

force is defined in the same way as was done by Austin. Additionally, Johnson takes into account something like 'degrees of force' which concerns relative emphasis, i.e., strengthening or attenuating the force of an utterance. This he defines as the 'force with which the sentence-container is thrust upon the hearer.' Examples:

11a. You might want to be a little careful around the lion. (mild force)
11b. For God's sake, watch out for the those lions. (strong force)

From Talmy's point of view, his discovery of force-dynamic patterns as part of sentential semantic structure leads us to believe that languages — even when they can otherwise be employed for sophisticated versions of modern physics — continue to incorporate prescientific conceptions of interactional dynamics, which pertain more to the domain of our common sense, or to what has recently been investigated under the rubric of 'naive physics'. This linguistic defiance of the logic of modern physics is comparable to what Lévy-Bruhl had proposed as the 'law of participation' or the 'prelogic' (Lecture 1) that he identi- fied in the 'primitive' mentality, and which he regarded as ineradicable from human thought in general. Talmy lists the following properties of linguistic force dynamics, which clearly contrast with the principles of dynamics, as conceived by modern physics:

i. the Agonist concept is accorded a privileged status in the interaction described. The Agonist is thus described as a foregrounded entity (i.e., the gestalt 'figure'). The antagonist is backgrounded. In short, the linguistic FD is topological- relational and qualitative, set within a gestalt frame of

perception. Physical theories are mostly concerned with the quantitative aspects of the interaction.

ii. the entities are conceptualized as having an intrinsic force tendency, or either toward action or toward rest. This contrasts with the idea in physics that the state of motion or rest of an entity is due to the force of another entity to which it may be causally linked.

iii. the entities are conceptualized as relatively stronger or weaker; the stronger entity may exert a force upon, help, hinder, leave alone, permit, or block a weaker entity from performing the action to which it is oriented.

iv. the linguistic FD permits two kinds of reduction of the interacting schemas. We may call them paradigmatic and syntagmatic reductions:

Paradigmatic reduction would refer to the discarding of physical quantities of the interacting entities. It allows to lump together ('chunk') ranges of physical diversity such as form, substance, rate, manner, etc. The simplified schema is purely topological and relational. The following sentences exemplify chunking:

12a. The heat broke the guitar.
12b. A falling radio broke the guitar.

Syntagmatic reduction would refer to the partitioning and culling out of the schema of an event from a chain of causal continuum. That is, events can be presented as autonomous, without causal precursor, or consequence. Examples:

13a. The book toppled off the shelf./ The ball sailed through the window.
13b. My cufflink finally turned up at the bottom of the clothes hamper.

Effectively, what Talmy has identified at the heart of linguistic semantic structure, are some kind of narrative structures. Force exertion, block, resistance to force, overcoming of force, blockage, and removal of blockage, and other FD patterns seem like part of a narrative schema. (The core content of the narrative structure in the tradition of V. Propp and A.-J.Greimas is indeed very similar. See forthcoming Lecture on the dynamics in narrative structures.) For the moment, let us recall that L. TesniSre had suggested that a logicist sentence analysis based in subject-and-predicate like structure can be rejected in favour of an actantial structure based on 'actants' (Lecture 1), and that Ren Thom's CT semantics had adopted the actantial paradigm of TesniSre and Greimas. We have also seen in Lecture 3 that the central fulcrum of the Paninian grammar as developed by Bhartrhari are the karakas, or the factors of action.

Indeed it is their dynamical perspective that prompted us to present and discuss the three approaches — Thom's CT semantics, Bhartrhari's Karaka theory, and Talmy's force dynamics — in these lectures. There are evidently many differences among them. It would be useful to list in detail the similarities and the differences.

Firstly, CT semantics and karaka theory are founded upon the grammatical case-structures. They serve to show that underlying the sentence structures there are dynamic schemas involving the interaction of actants or karakas which have semantic values like agent, patient, beneficiary, goal etc. Their ideas are closely aligned with those of the case-grammars proposed by L. TesniSre, John Anderson, and Charles Fillmore. On the

contrary, Talmy's 'force dynamics' idea pursues an alternative trajectory of semantic 'causativity'. As we have seen, between causativity and 'agentivity', Talmy chooses the former. Agentivity, in Talmy's view, though syntactically simple, is semantically complex: the agentive syntactic structure is obtained by a reduction of the more natural, semantic causative structure. (E.g., "The ball's hitting the lamp toppled it" is semantically simpler and syntactically more complex than "I made the lamp topple by hitting it with a ball".)

Secondly, the archetypal morphologies or the topologico-dynamic schemas of CT semantics are mathematically deduced. Neither, the karakas nor the FD patterns are so deduced. The latter two are thus more empirically based.

Thirdly, there is a strong sense of philosophical Realism that pervades CT semantics. It is assumed that corresponding to the mathematically schematized sentential dynamics there exists real world dynamics that are isomorphically captured by the sentence structures. Though he belongs to the Brahmanical school that in general accepts Realism, Bhartrhari as a grammarian gives ample importance to the speaker's point of view. Thus, for Bhartrhari, the actions referred to by the sentences are real, but the particular karakas are determined from the point of view of the speaker. Talmy's perspective on 'conceptual structures' suggests merely ways of seeing the world, and hence is rather Nominalistic.

Fourthly, the prototypicality idea is very strong in CT semantics. In fact, the difference between 'archetype' and 'prototype' is only a matter of emphasis. The former has reference to the evolutionary ('morphogenetic') and the biological-physical, while the latter to the perceptual- developmental. The karaka notions are implicitly prototypical, for any entity can be assigned a particular karaka value depending upon the role it is perceived as playing in

an action. For Talmy, the prototypical FD category is the causative ('force exertion'). He identifies the other FD patterns, such as letting, hindering, helping, blocking, etc., in relation to this prototypical causativity. FD notion is regarded as a 'generalization' over the traditional causative notion.

Fifthly, all three approaches recognize some sort of 'intrinsic force tendency' for the entities. (A) In the karaka theory, it is conceived of as a Realist force ('shakti') which all entities have implicitly. However, how the precise manner in which the force of an entity participates in a sententially described action is a matter of the speaker's perception. (B) The idea of intrinsic force tendency (toward action / rest) is quite explicit in Talmy's FD. (C) In line with J. von Uexqull's biologistic perspective, Thom had spoken of a 'salience' (= the external form) and a 'pregnance' (= the internal form) possessed by organisms, which govern the principal biological interactions based in recognition of relations of prey, predator, and (sexual) partner. These relations are supposed to underlie concept formation, and hence language.

Sixthly, CT semantics and FD adopt the perspective that the interactions should be considered devoid of the physical and quantitative concretions of the entities. It is the topological- relational aspect of the interactive dynamics that is seen to be linguistically pertinent. This idea is only implicitly present in the karaka theory.

Appendix

a. causing

b. resisting

c. overcoming of resistance

d. blocking
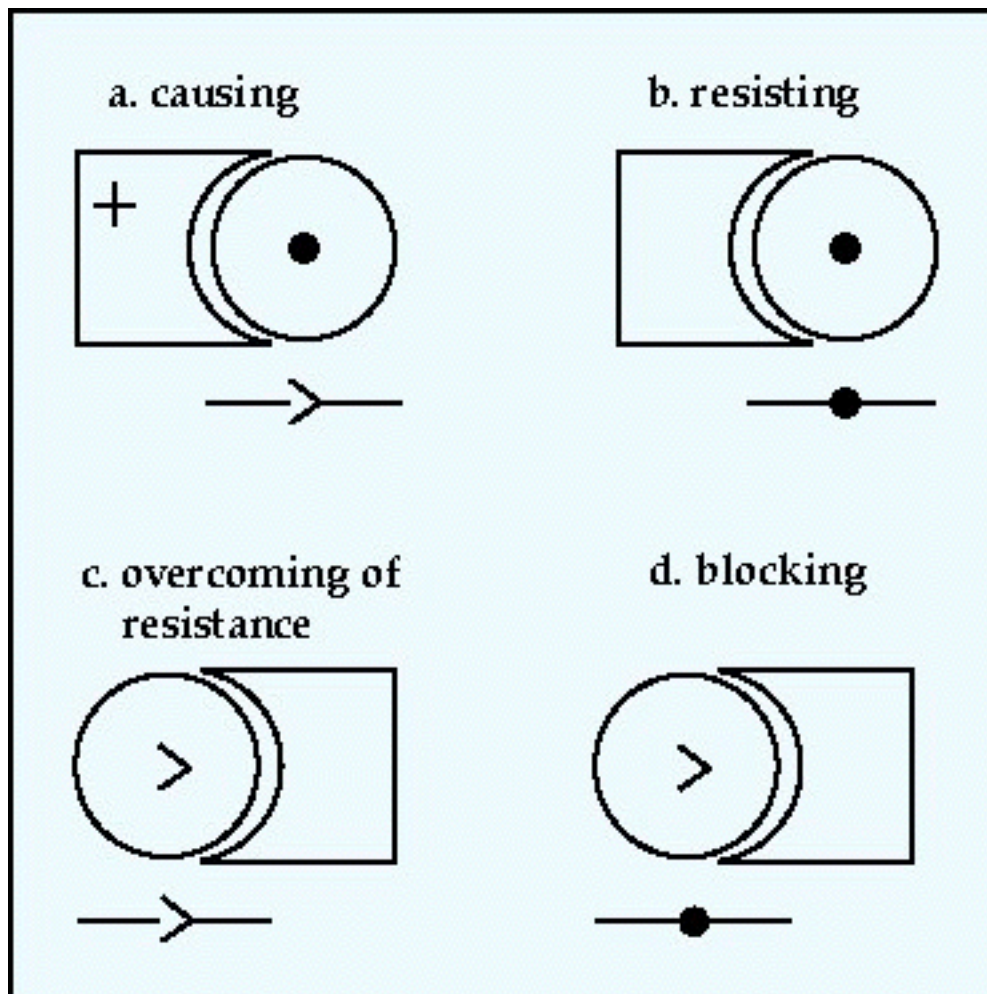
References:

Lakoff, G., 1987. *Women, Fire, and Dangerous Things. What Categories Reveal About the Mind.* Chicago: University of Chicago.

Johnson, M., 1987. *The Body in the Mind. The Bodily Basis of Meaning, Imagination, and Reason.* Chicago: University of Chicago.

Sweetser, Eve, 1990. *From Etymology to Pragmatics. Metaphorical and Cultural Aspects of Semantic Structure.* Cambridge: CUP.

Talmy, Len, 1988a. "The Relation of Grammar to Cognition", in: B. Rudzka-Ostyn (ed.) *Topics in Cognitive Linguistics. Current Issues in Linguistic Theory* 50. Amsterdam: J. Benjamins.

—, 1988b. "Force Dynamics in Language and Cognition", *Cognitive Science* 12: 49-100.