

# Material Object Transfer and Communication of Ideas

## Analogy of Naive Theories and its Linguistic Manifestation

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### Abstract

Analogies between material object exchange and communication abound in figures of speech, e.g. "exchange of ideas". But, as transfer of information entails no loss of it to the donor, the obvious analogy fails. To explicate, I consider first a formal, minimal naive theory OTM of object location/possession and transfer. Failure of the obvious analogy translates as absence of any intuitible model of communication related to OTM by an isomorphism which maps people ("possessors") to people, and objects ("possessions") to ideas ("propositions", "infos"). Isomorphisms to a counterintuitive model MCM of communication and belief are, however, exhibited which map objects to people ("believers") and persons to ideas. Under the interpretation appropriate to MCM, the schemata of crucial postulates of OTM instantiate to epistemic instances of the Laws of Contradiction and Excluded Middle. MCM features complementary ideas which, as it were, appropriate or lose adherents. Empirical instantiations of this apparently counterintuitive theory are shown to occur in the lexicologies and ideologies of possession by ideas (and, perhaps, by their yet more anthropomorphic spirit avatars) and in the grammar of expressions for a change of mind. Thematic role structure, relations to "middle" constructions and, briefly, use in verbal action are discussed. I conclude that the mental leap reflected in the linguistic data warrants use of moderately formal tools to investigate open class lexica of natural languages for underlying theories.

### Communication as Exchange?

What is communication? "An exchange or at least transfer of something, viz. information", says common sense. Languages tend to concur. The "conduit metaphor" [CM] (Reddy, 1979) offers *getting a thought across* and *giving ideas*. And when Eve tells Adam the time, Eve *gives*, and Adam *receives* information. Moreover, canons of gossip -- *exchange of confidences* -- bespeak an obligation to repay in kind.

But the analogy suggested by CM meets an obstacle. If you give away a material object, you no longer have it. Whereas imparted information is not thereby lost to you (Leach, 1970:110 *contra* Lévi-Strauss, 1945). Among people, only rights to and advantages of its exclusive use are alienable. This difference, reflected already in phrases such as *imparting* or *sharing information*, also prompted well-known distinctions in the linguistic literature following Gruber (1965) between physical, abstract and indeed mental transfer.

Ask next: what is a criterion of analogy? Standardly, the existence of a structure-preserving map (homomorphism) of relational structures. I therefore consider a grossly underspecified, axiomatic theory having a model OTM of object transfer, just complex enough to engage intuitions of exchange. I then look for an equally simple model in the domain of communication (i) related to OTM by a structure- and cardinality-preserving map, i.e. an isomorphism, and (ii) engaging the intuition that communication brings about changes of epistemic state. Then I exhibit empirical instances of the same analogy in natural languages.

One objective is to show how the search for isomorphisms -- taken literally and pursued formally -- can elicit metaphoric structure which has remained unexplored to date.

Another objective is to investigate the metaphoric correspondence for its bearing on current debate concerning the semantic content of "thematic relations" (Dowty, 1991; Gruber, 1965; Jackendoff, 1990) that intertwine spatial, causal and social constraints.

Point of departure for the analysis is an attempt by Luc Racine (1986) to characterize elementary notions of reciprocity in terms of a simple paradigmatic situation and some of its structural constraints.

### Racine's Model of Material Object Transfer: OTM

Racine (1986) offers for consideration a system of two persons (more abstractly: 'poles') -- call them Adam and Eve -- and two material objects, *X* and *Y*, such that each object can be held by at most one pole at any one time, and must be held by at least one at any given time. This yields a set of 4 possible states. In close to Racine's graphic notation:

$$\begin{array}{ll}
 s_{00} [A_{XY}; E_{..}] & s_{01} [A_{X.}; E_{.Y}] \\
 s_{10} [A_{.Y}; E_{X.}] & s_{11} [A_{..}; E_{XY}]
 \end{array}$$

He then considers possible changes of state, i.e. transitions in which objects move from pole to pole. Abstracting from distinctions of perspective ('giving' vs. 'receiving'), which evidently are not represented in such a simple structure, he first considers transitions that preserve information about source and target. Example: *X* moves from *E* to *A*. Not finding interesting structure there, he abstracts further, considering transitions of the form "*X* moves" and aims to identify the product of such transitions, which are their own inverses, with themselves as the underlying structure of the notion "loan (and return)". The product of two distinct transformations is to be identified with the notion "exchange".

This enterprise could not be wholly successful. At the level of extreme abstraction chosen by Racine crucial distinctions of sequence collapse: "loan" cannot be distinguished from no transaction at all. Similarly for distinctions of initial and target state: "exchange" requires initial and final states where not both objects are held by one party alone.

Despite its failure to serve the intended sociological purpose, Racine's simple paradigm is a useful point of departure for analyses of semantic structure in which, as so often (Lakoff & Johnson, 1980:17), spatial representations provide the basic organizational pattern. However, we shall see that a very abstract structure (specified, if anything, in "propositional" terms, to use the terminology of Lakoff 1987:118) provides our basic naive theory. Its most natural concrete model is indeed spatial. But there is also a fairly compelling sociological model, albeit one of which intuitively important features are left underdetermined by the abstract theory.

To investigate precisely what constraints implicit in intuitive theories are captured by which structural relations of our explication I propose to invest in machinery more often met in closed-class semantics. (Hoping to convince the empirically-minded reader in due course that there is some payoff to such tedium after all.)

Recast in formal terms Racine's paradigm is a structure

OTM =  $\langle \text{Ind}_p, \text{Ind}_o, \text{Rel}; \text{Sto}; \text{Pop}; \text{Op} \rangle$

where

$\text{Ind}_p = \{E, A\}$  a set, intuitively of two persons ("poles");  
 $\text{Ind}_o = \{X, Y\}$  a set, intuitively of two material objects;  
 $\text{Rel}$  a set of binary relations  $R_{ij} \subset \text{Ind}_o \times \text{Ind}_p$ , intuitively "is held by" or "is in the possession of" (or "is located at");  
 $\text{Sto} = \{s_{00}, s_{01}, s_{10}, s_{11}\}$  a set of (types of) 'social states';  
 $\text{Pop} \subset \text{PF}(\text{Sto})$ , the set of partial functions  $\text{Sto} \rightarrow \text{Sto}$ ;  
 $\text{Op} = \{x, y, z, I\} \subset \text{PF}(\text{Sto})$  is a set of total unary operations;  
 and

[1] Each of  $X, Y$  is  $R$ -related to ("held by") exactly one of  $A, E$ .

Put differently:

[1']  $\text{Rel}$  is, extensionally, the set of (total) functions  $\text{Ind}_o \rightarrow \text{Ind}_p$ .

In [1] "exactly one" thus factors into "at most one" and "at least one". Correspondingly [1'] requires that any  $R \in \text{Rel}$  be a *partial function* and *left-total*.

We identify each  $s_{ij} \in \text{Sto}$  with an  $R_{ij} \in \text{Rel}$ . (By [1]/[1']  $\text{card}(\text{Rel}) = 4$ .) Extensionally, any  $R \in \text{Rel}$  is a set of (two) ordered pairs  $\langle \alpha, \beta \rangle$  ( $\alpha \in \text{Ind}_o, \beta \in \text{Ind}_p$ ). I.e.  $\langle \alpha, \beta \rangle \in R$  iff  $\alpha R \beta := "$  $\alpha$  is held by  $\beta$ ". Mnemonically labeled:

$s_{00} [XAYA] := \{ \langle X, A \rangle, \langle Y, A \rangle \};$   
 $s_{01} [XAYE] := \{ \langle X, A \rangle, \langle Y, E \rangle \};$   
 $s_{10} [XEYA] := \{ \langle X, E \rangle, \langle Y, A \rangle \};$   
 $s_{11} [XEYE] := \{ \langle X, E \rangle, \langle Y, E \rangle \}.$

Thus,  $\text{Pop}$  consists of partial functionals  $[\text{Ind}_o \rightarrow \text{Ind}_p] \rightarrow [\text{Ind}_o \rightarrow \text{Ind}_p]$ .

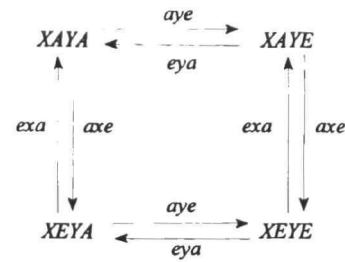


Figure 1 (Gr 1)

Mnemonic labels *aye* etc. denote these state-transitions (Fig.1). Example:  $XAYA := "$ X is held by A, Y is held by A";  $axe := "$ X moves from A to E. If we add function composition, e.g.  $exa \cdot aye$ , graph Gr1 becomes a small category (specifically: a groupoid). However, intuitions that distinguish sequentiality from simultaneity, and "forth-and-back" from "no change" cannot be so represented. They are if we treat the graph as an abstract machine and let pairs  $\langle \text{initial-state}, \text{string-of-edge-labels} \rangle$  represent transactions, indexing states by times  $t_i$ .

Then one can project (as Racine more or less did on the way to less attainable goals) upon a sequence of transitions  $XAYA_{t_1} \cdot aye \cdot XAYE_{t_2} \cdot eya \cdot XAYA_{t_3}$ , the sociological description "loan of Y by A to E, and return of Y". (Though no constraint precludes e.g. "theft and recovery".) And upon a sequence  $XEYA_{t_1} \cdot aye \cdot XEYE_{t_2} \cdot exa \cdot XAYE_{t_3}$ , "exchange in which A gives Y to E and E gives X to A" or "in which E robs A of Y and A robs E of X". The latter should instantiate typical forms of reciprocity or retribution.

On paper this projection sounds less than compelling. But the thesis (and one I expect to be substantiated soon) would be that experimental set-ups à la Michotte (1963) mildly cued will reveal their conceptual salience. Yet for now what matters is not ecological salience, but the conditional: "If salience here, then salience there". "Here" is OTM. What, then, is "there"?

## Communication and Exchange

Racine (1979) had also considered information exchange, presupposing the message / object analogy. Information "units" are "held" by persons and distributed as the case may be. This set-up (not to be confused with rather more sophisticated theories of information economics) yields no useful formal structure.

Pleasant and ubiquitous as the analogy proposed by the conduit metaphor is, in which information objects ("propositions" or, if you will, "infons") take the place of material objects, it does not extend well. If "held by" spells "believed by" (conflate with "known to" for the nonce) there is no useful intuitive interpretation for a structure with persons  $A, E$  and propositions  $X, Y$  such that

[#] "Each of  $X, Y$  is believed by exactly one of  $A, E$  (at any time/state)".

Relations admitted by [#] would characterize states in which just one person believes both propositions (and the other might be

fully agnostic) along with states where each person believes a different proposition. No intuitable model of communication seems to fit this pattern. The prototype relation of being *in possession of*, like that of being *spatially located at*, is a **function**. The relation of being *known to* or *believed by* is not. If proposition  $\Phi$  is believed by Eve (E) it might as well be believed by Adam (A) too.

Now consider a situation where E comes to believe  $\Phi$ , whereas A doesn't (yet). But then A comes to believe  $\Phi$  too. In many contexts we should infer that E had communicated  $\Phi$  to A (or persuaded A of  $\Phi$ ). Having just three individual entities A, E,  $\Phi$  there can be no strict analogy, i.e. isomorphism, to a comparably sparse model of object transfer which engages, however crudely, the notion of exchange. But now consider a structure

MCM =  $\langle \text{Jnd}_p, \text{Jnd}_o; \text{Qel}; \text{Stc}; \text{Pcp}; \text{Cp} \rangle$

where

$\text{Jnd}_p = \{E, A\}$  a set, intuitively of two persons ("poles");

$\text{Jnd}_o = \{X, Y\}$  a set, intuitively of two material objects;

Qel a set of binary relations  $Q_{ij} \subset \text{Jnd}_o \times \text{Jnd}_p$ , intuitively "believes" or "is committed to";

Stc =  $\{c_{00}, c_{01}, c_{10}, c_{11}\}$  a set of (types of) "commitment states";

Pcp  $\subset \text{PF}(\text{Stc})$ , the set of partial functions  $\text{Stc} \rightarrow \text{Stc}$ ;

Cp =  $\{x, y, z, I\} \subset \text{PF}(\text{Stc})$  is a set of total unary operations;

and Qel contains all and only those  $Q_{ij}$  in  $\text{Jnd}_p \times \text{Jnd}_o$  satisfying

[2] Each of A, E is Q-related to ("believes") exactly one of X, Y. Thus:

[2'] Qel is the set of (total) functions  $\text{Jnd}_p \rightarrow \text{Jnd}_o$ .

Given [2], what pairs of propositions would be natural instances for X, Y? Well, pairs such that  $Y = \neg X$ , i.e. pairs of contradictories. For then the requirement that Q be a partial function would be the epistemic correlate of the "Law of Contradiction"  $[\neg(X \ \& \ \neg X)]$ ; and the requirement that Q be total the epistemic correlate of "Excluded Middle"  $[X \vee \neg X]$ . (A partition  $\{X, \neg X\}$  is familiar as a binary issue or, as statisticians say, a dichotomy.)

As in the case of "exchange", we need three (suitable!) states and intervening transitions to impute communication. E.g.:  $\text{AXEX}_{11} \xrightarrow{\text{xey}} \text{AXEY}_{12} \xrightarrow{\text{xay}} \text{AYEY}_{13}$ . Intuition: to start with both E and A believe X; now E changes her mind (endo- or exogenously) then A changes his (Fig. 2).

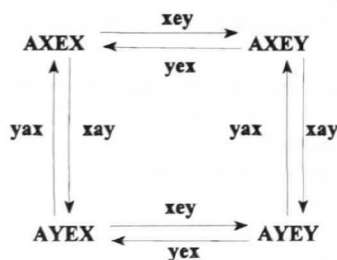


Figure 2 (Gr 2)

Without cueing this description is hardly compelled by the

structure. (We want experiments in the vein of Michotte 1963 and Premack 1990.) But it is consistent with it and can thus motivate epistemic interpretation of states.

## Analogy and its Linguistic Reflexes

Look at our two-sorted domains  $\text{Ind} := \{A, E, X, Y\}$  and  $\text{Jnd} := \{A, E, X, Y\}$  and the two corresponding sets of possible states given by Rel and Qel. There are  $4! = 24$  distinct bijections from Ind (a 4-element set) to Jnd (a 4-element set). Only 4 of these extend to R-isomorphisms: exactly those which map the *persons* of Ind to the *propositions* of Jnd, and the *objects* of Ind to the *persons* of Jnd. Why?

A mapping  $\psi: C \rightarrow D$  where D and C are sets endowed respectively with relations R and Q is an *R-homomorphism* iff R and Q are similar relations and, for any  $c_1, c_2$  in C, if  $c_1 R c_2$  then  $\psi c_1 Q \psi c_2$ . The homomorphism is an *R-isomorphism* iff it is also a bijection, i.e. maps each element of C to exactly one element of D.

What makes relations R and Q of same arity "similar"? An abstract characterization of this is needed to if questions are not to be begged. And it is supplied by [1'] and [2']. If one or both persons were mapped to persons by a bijection  $\psi$ , one or both objects would be mapped to propositions. But whereas any admissible relation on  $\text{Jnd}_o \times \text{Jnd}_p$  is a *function*, not all admissible relations on  $\text{Jnd}_o \times \text{Jnd}_p$  or on  $A \times B$  (where  $A = \text{Jnd}_p$ ,  $B = \text{Jnd}_o$ , and  $\text{card}(A) = \text{card}(B) = 2$  and  $A \cup B = \text{Jnd}$ ) are functions. Only those on  $\text{Jnd}_p \times \text{Jnd}_o$  are all functions. Hence  $\psi$  would not in general preserve R-structure.

Now the mere existence of isomorphisms does not guarantee good analogy (witness the late Klein-4-Group Cargo Cult). Goodness also depends on how much structure ignored by simplification to isomorphic models would be preserved under map-extensions defined on models of theory-extensions. Here this means: do families Rel and Qel and their (co)domains have more in common than comprising functions from two-element sets to two-element sets?

Consider the relations denoted by *is held by*. Isomorphic transfer from Sto to Stc yields partial Stc-descriptions of the form "Person  $\alpha$  is held by Proposition  $\beta$ ". This accords poorly with the English expression of persons "holding beliefs".

However, substituting *adheres to* or *is committed to* yields a smoother fit; and even sociological sense. Witness Menger's (1934) sociologicistic notion of the extension of an idea (proposition): the set of persons believing it.

More importantly, the kind of apparent role reversal undergone by persons in the mapping is routinely lexicalized in natural languages. People can be *possessed*, *besessen*, *possédés*, etc. by an *idea* or by a *belief*. It can *take hold of* you; have you *in its grip*; and so on. And in its properly anthropomorphic form the notion has been keeping exorcists

busy for all of time memorial. Possession by spirits is a good candidate for an anthropological universal. If so, a naive, tacit theory of communication in which *ideas* are, if anything, *agents* -- and *believers*, if anything, *patients* (cp. Dowty, 1991 on clusters of properties for "proto-agents" and "proto-patients") -- takes on a significance wider than is usually conceded to dead metaphor.

The moment of *exclusive control* that defines possession of objects in the law (cf. the Oxford English Dictionary) has a counterpart in the constraint on conduct which commitment to an

idea involves. And in turn, material goods committed to a purpose are, in effect, under the exclusive control of (whatever serves) that purpose. Such relations are asymmetric, and so are their linguistic reflections. Example: *John is {ruled / governed / dominated by / in the grip of} the {idea / belief} that the earth is flat*, but *\*The {idea/belief} that the earth is flat is {ruled / governed / dominated by / in the grip of} John*. Even the closed-class lexicon (possessive preposition *of*) and inflectional morphology (German Genitive) arguably concur. You can be *of the opinion that*, *de l'opinion que*, *der Meinung*, *dass*, or jointly *of one mind*, *du même avis*, *einer Meinung* or *eines Sinnes*, or, by German contrast, *geteilter Meinung* when opinions are divided.

Suppose we pursue the analogy. From the picture of conflicting ideas, which come in complementary pairs and appropriate or alienate adherents, to Durkheimian "collective representations" and supra-individual "social forces" it is but a small step. Its value to Anthropology writ large is not my business to judge. In simple anthropology, however, we note the use of such representations in verbal action: to downplay personal responsibility. The best known grammatical correlate of such efforts at disingenuousness is, of course, the passive voice. But here we get something less familiar.

In MCM persons move between ideas, just as in OTM objects move between persons. A change of mind, opinion or ideas corresponds to a change of hands, viz. a change of owner or possessor. Objects change hands, persons change their mind. The change is not gradual; i.e. minds and hands are not worked as "incremental themes" in the sense of Dowty (1991).

Widely taught European languages differ slightly in imputed degree of agentivity. French partitive *Jean changea {d'avis / d'idée / d'opinion}*, like pronoun- and article-free English *John changed {hands / owner / possessor / colour}* represents the subject as undergoing the change rather than initiating it. *Changer de* leaves open who, if anyone is agent or patient. Says *Trésor de la langue Française*, salomonically: "the change affects both subject and object". *Change possessor / owner, change hands* and *change sides* cannot be transitive V-NP (verb-object) constructions (*pace* Oxford English Dictionary) but are fairly idiomatic intransitive complex verbs. Test: *change* won't passivize as in transitive occurrence. Thus we have *\*{Hands / Possessor / Colour} {were / was} changed (by the ball)*.

English gives thinkers a more active role: *mind* does not pattern with *colour* and needs a possessive pronoun agreeing with the active-voice grammatical subject: *John<sub>i</sub> changed his<sub>j</sub> mind*. Note the oddity of any reading with  $\neg(i = j)$ , whose sarcastic ring will indicate flouting of a constraint. Unlike *crane his neck*, however, *change his mind* admits non-identity subjects if they denote facts or environmental eventualities, e.g. *{The weather / Meeting Kim / ?Kim} changed Sandy's mind* and *Sandy's mind was changed by {the weather / ?Kim}*. Closer here than Fr. *changer d'avis* is *se changer les idées* as in *Je me change les idées*. And it is similar in that *Cela me changea les idées* is attested (T.L.F), but the likes of *Jean me changea les idées* are odd.

German is neutral: *Jo wechselte die Ansicht* ("Jo changed his point of view"); *{Jo / Das Geld} wechselte den Besitzer* ("Jo / The money changed possessor") have the same syntax as *Jo wechselte {die Farbe / das Hemd}* ("Jo changed {colour / his shirt}"; cp. Fr. *Jo changea de veste*). In sentences of this form,

e.g. *Der Ball wechselt den Besitzer* (word for word: "The<sub>NOM</sub> ball changes the<sub>ACC</sub> possessor") the subject, prototypically in Agent role (cf. Jackendoff, 1990), is here, in the reality of legal imputability, the patient. Whereas the legal agent is in object position with accusative case marking. But for many German speakers too *Jo<sub>i</sub> änderte seine<sub>j</sub> Meinung* is subject to a constraint  $i = j$ .

Consider also the minimal pair *John moved {i. house / ii. {the / his} house}*. In (i) John moves; in (ii) the house. As in *John changed {i. sides / ii. {the / his}} sides*. It is the notion of "undergoing a change" -- changing position with respect to a given coordinate system -- that informs the simple absolute forms *move (N / NP)* and *change (N / NP)* and distinguishes them from transitive *move NP* and *change NP*, which do not require non-animacy of the NP denotatum. *John changes {hands/his mind}* is, in this semantic respect, like a "middle" construction", such as *This fabric washes easily*.

Fagan (1992:2) notes for Indo-European middles: "surface subjects that are notional objects", and inability to specify notional agents with *by*-PPs. Benveniste (1972: Ch. 14) sees the subject as "doing something which happens to it". Kemmer (1993) ranges beyond Indo-Europe and offers, somewhat like Benveniste, (i) "initiator as affected entity" along with (ii) "low degree of elaboration" of event structure.

Persons who change their mind are, in MCM, being represented as affected entities, i.e. Themes in the spatially rooted sense of Gruber (1965) and Jackendoff (1990). And yet surface form of our example constructions with *change* leaves agency very often ambiguous. This brings us to Kemmer's second criterion, which is said to subsume the first. Here we have a more specific formal correlate, which also reveals another twist in the metaphoric correspondence.

### More Abstract State Transformations

In OTM any basic non-identity transition connects two states. Racine aimed to explicate notions "loan" and "exchange" by elements of the "Klein 4" ( $D_2$ ) group ( $x, y, z, I$ ) of maps in Op on Sto (see Figure 3). (The canonical model of this group are the symmetries of the rectangle: flips around the vertical and horizontal axis, and rotation through  $180^\circ$  around the center of gravity.) Each of  $x, y, z$  composed with one of the other two yields the third. And any transformation is its own inverse: composed with itself it yields the identity transformation  $I$  ("no change").

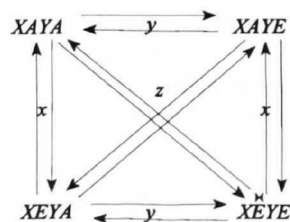


Figure 3

Racine's descriptive appeal to algebra was misguided. Even

ignoring temporality and the structure of obligation,  $z$  (i.e.  $xy$ ) would cover unilateral appropriation / alienation of all "assets" no less than reciprocal exchange. However, for present purposes some linguistic and diagnostic interest attaches to such abstraction from directionality and perspective.

First, one can plausibly identify  $x$  with the intuitive notion "X changes hands", similarly  $y$  for Y; and their product  $xy = z$  with the notion "Both objects change hands". (As long as one considers initial and resulting states alone.) Secondly, the non-identities (any one of which is the product of the two others) generate subgroups  $(x,I)$ ,  $(y,I)$  and  $(z,I)$  of Op that each partition Sto into *orbits*: sets of those states which are transformable by elements of the subgroup into one another. Adding natural descriptions we get

Sto/x := {{XAYA, XEYA}, {XAYE, XEYE}}  
 "Y is held by A", "Y is held by E"  
 Sto/y := {{XAYA, XAYE}, {XEYA, XEYE}}  
 "X is held by A", "X is held by E"  
 Sto/z := {{XAYA, XEYE}, {XAYE, XEYA}}  
 both are held by one", "one is held by each"

The descriptions for the orbits of  $(z,I)$  are the most general non-trivial descriptions among those available in that they do not make reference to specific individual entities. Those for Sto/x and Sto/y must always refer to specific individuals. We can characterize the two disjoint sets of states in Sto/z more laconically yet by intuitive, natural-sounding predicates of states:

{XAYE, XEYA} := *balanced states*;  
 {XAYA, XEYE} := *unbalanced states*

If suitably intuitive values attach to objects, then balanced states are those where the difference between the two persons' intersubjectively assigned asset-values are at a minimum (or, for present purposes, zero). An "exchange" always transforms balanced states into balanced states (and, if not simultaneously, then by way of an unbalanced intermediate state).

In MCM let  $Cp = \{a,d,e,J\}$  be the elements of the  $D_2$  transformation group acting on Stc (Fig. 4), interpreted respectively, as A changes his mind (from X to Y, or Y to X), E does, both do, neither does.

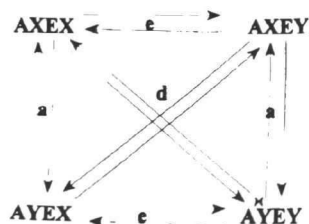


Figure 4

We obtain

Stc/a := {{AXEX, AYEX}, {AXEY, AYEY}};  
 "E believes X", "E believes Y"  
 Stc/e := {{AXEX, AXEY}, {AYEX, AYEY}}  
 "A believes X", "A believes Y"  
 Stc/d := {{AXEX, AYEY}, {AXEY, AYEX}}  
 "both believe the same", "each believes something different."

Again, one of them, Stc/d, stands out by generality of description. Two more intuitive ways of describing the equivalence classes in Stc/d, with respective psychological and sociological slants, are:

{AXEX, AYEY} := the two persons agree;  
 {AXEY, AYEX} := the two persons disagree .

Call these two classes respectively the sets of *harmonious* and of *disharmonious* states. Now {AXEX, AYEY}, the set of *harmonious* states in Stc, is the set of initial and final states for what comes closest to a transaction of *communication* in MCM. And the set {XAYE, XEYA} of *balanced states* in Sto is the set of initial and final states for what comes closest to a transaction of *exchange*. Thus, an isomorphism from the Object-Transfer-Graph Gr1 to the Mind-Change-Graph Gr2 that maps "exchange" to "communication" must map *balanced* to *harmonious* states.

So there is no set of maps from the Object-Transfer structure to the Mind-Change structure which both maps 'exchanges' to 'communications' and preserves the internal structure of states (state-isomorphism)!

This is easy to see. Structural labels XEYA and XAYE (balanced states) each contain four alphabetically distinct letters; AXEX and AYEY (harmonious states) each contain only three. This second twist perhaps occasions in part the unobviousness of the analogy. Communication in MCM, unlike what one would expect from the notion of exchange, corresponds to unilateral appropriation of believers by one idea.

Descriptive non-generality also happens to correlate with intuitions of instability. There is a common presumption that *unbalanced (inequality) states* should tend to change to *balanced (equality) states*; and that *disagreement* should be resolved to agreement. This takes us from kinematics (specification of how systems can change in time), well into naive dynamics (how they should tend to change, given initial conditions).

## Conclusions and Implications

Each semantic field, writes Jackendoff (1990:27), has particular "inference patterns". His example is, not wholly surprisingly, the spatial domain seen through its "fundamental principle" that an object cannot be in two disjoint places at once. And he points out, in line with tradition, that information which goes from one person to another will "be" at, or with, the target of the transfer (as in the spatio-temporal domain of objects) but will not thereby (unlike in the spatio-temporal domain of objects) cease to be at the source.

So this part of the inference -- that an entity going from one location to another will no longer be at the first -- now fails to go through. Jackendoff concludes that this presents an argument for decomposition into "features" of meaning.

The present example shows that attention to features that

combine additively, wedded as it is to strong intuitions of content, would dispose one to overlook a significant structural aspect of lexical and, if you will, metaphoric relations. Viewed more abstractly, and treating would-be inference patterns as axioms of theories with models in more or less concrete relational structures, lexical relations can be investigated in properly model-theoretic terms.

One advantage of proceeding thus, expensive as it might seem, is that we get characterizations of structure which are independent of particular contents of specific concrete models. It becomes much easier then to decide which features of a given concrete model can be specified in structural terms (and hence are indeed accounted for by one's intended account of metaphor) and which ones are unexplicated contraband.

The abstract theory, of which two socio-economic and socio-epistemic models are presented above, is most compelling in the purely spatial domain. It is no accident that the spatio-temporal notion of an entity moving or being located with respect to ostensibly given points reference is prominent enough in lexical semantics to play the ubiquitous role or cluster of roles labelled Theme by Gruber (1965).

Somewhat less obvious, though not by much, is the correspondence of the spatial constraints -- having to be at some place and not being able to be at more than one -- to the logical constraints of Excluded Middle and Non-Contradiction. Having the two sets of constraints as constituents of models of one and the same abstract theory might then raise questions about which induced which.

But then the socio-economic notion of possession enters the picture and forces one to consider in semantic representation, next to the "thematic" tier of location and motion, an "action" tier of agent-patient relations (Jackendoff, 1990; in line with Culicover & Wilkins, 1984; Talmy, 1985). Clearly, uniqueness of possession is as open to qualification as the idea that anything which can be possessed must have some possessor. But such a qualification, in the first case and at least in contemporary European cultures, is a deviation from the legal ideal of unmitigated control. And even the second aspect may be close to usual expectations; much as Excluded Middle, which common idiom, viz. *being in two minds*, appears to conflate with Non-Contradiction.

One question raised by the interaction of three domains -- intuitively: the spatial, the economic, and the mental -- is which of two potentially competing semantic dichotomies, Talmy's and Jackendoff's pair of Thematic and Action tiers or Dowty's two clusters of Proto-Agent and Proto-Patient roles, provides the more productive approach to which class or aspects of lexical phenomena.

The set of models introduced above, fortuitously or not, appears initially to favour the distinction along Thematic and Action tiers. For clearly, the most compelling model of the naive miniature-theory satisfied by OTM and MCM is that of spatial location and motion. Intuitions of properly social relations, apparently economic or apparently doctrinal, are not directly captured by the theory, though consistent with it.

However, the ease with which constraints proper to these domains latch on to those of the spatial domain in metaphoric transfer bespeaks the power of the second dichotomy of clusters. And perhaps the proliferation of notions of "affectedness" in Jackendoff (1990) indicates something else: that we can start to speak of a cognitive semantics of content only to the extent that

we command theories of the would-be domain of denotata which come close in elegance and sophistication to those at our disposal for the physical realms.

Finally, I should return to a question briefly touched upon: the rhetorical function of de-agentivization in MCM. This is a characteristic of passives and middles and the less than disinterested use of the former is well established in exculpatory discourse. MCM is a reminder that abstract structure of naive theories of communication and cognition has eminently practical, sophisticated uses.

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