

## Association Mechanisms and the Intentionality of the Mental

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This paper is an explanation of how the intentionality of perception is due to specific associations of sensations. It describes the intentionality of the mental and the problem that intentionality poses for accounts of the mind. The concept of “direction of fit” or “fulfillment of the act” is central to this description. An amalgamation of various recent interpretations of intentionality into a unified theory is presented along with an account of why even such a unified theory fails to account for direction of fit. The direction of fit of perceptual intentionality is then elucidated as a function of patterns of association of sensations. Objections to this associational manner of conceiving of intentionality are responded to and evidence in support of the overall conception is provided. The paper concludes with a brief explanation of how this characterization of direction of fit applies to other domains of mental activity that exhibit intentionality.

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Recent endeavors to explain the intentionality of the mental have met with a good measure of success. Thinkers in past decades have regarded the apparent intractability of efforts to give an extensional interpretation to the intensional linguistic idiom as evidence for the trans-natural ontological status of the mind (Geach, 1977, pp. 26–28; for a recent die-hard defender of this notion that intentionality is transcendent viz. Haldane, 1996, 1997). Others have regarded this difficulty as grounds for simply excluding altogether the propositional attitudes from scientific accounts of reality (Quine, 1976a, 1976b). Philosophers of cognitive science who have actually made progress in articulating sophisticated descriptions and explanations of intentionality include Kenneth Sayre, Fred Dretske, Ruth Millikan, John Searle,

Jerrold Fodor and Patricia and Paul Churchland. Dretske and Sayre articulated the foundations of this account in their conceptualizations of the mind in terms of information theory (Dretske, 1981; Sayre, 1976). Milikan extended this basic conception through her explication of the evolutionary origin and function of the intentional relation (Milikan, 1984). Searle and Fodor have enriched the understanding of the causal element in intentionality (Fodor, 1987; Searle, 1983). And the Churchlands have coordinated this evolutionary–causal–information theoretic explanation of intentionality with functionalist theories of the mind (Churchland, 1988; Churchland and Churchland, 1998). Though these researchers have not regarded their efforts as being in consort, their accounts can be consolidated into a rich conception that comprehends many aspects of perceptual intentionality (Haugeland, 1990, provides an excellent overview of such a consolidation). However, even this amalgamated conceptualization suffers a defect — an essential aspect of the intentional relation is not captured. This paper both exposes and remedies this lacuna. Part one of the paper is a description of the general concept of intentionality and distinctive features of perceptual intentionality, with especial attention to “direction of fit” in acts of perception. It also includes a characterization of how the causal aspect of perception is contained within the very act of perceiving and thereby constitutes this direction of fit. The second part comprises a survey and consolidation of various attempts at explicating the nature of intentionality and an elucidation of how even this amalgam fails to explain direction of fit. The third and crucial part of the paper contains the explanation of how direction of fit in visual perception is a function of very specific complexes of associations of visual and tactile sensations. The upshot of this explanation is that the intentional perceiving of a thing occurs whenever the associational pattern of sensations that is caused by the thing has the same form as the causal relation between the thing perceived and the sensations that it causes. Part four comprises brief consideration of objections to and evidence for this way of explaining perceptual intentionality. The final part of the paper considers how the account of intentional direction of fit in terms of association patterns could be extrapolated to other domains of mental activity that exhibit object directedness.

### The Intentionality of the Mental

Many states and acts of the mind are intentional or representational. If a mental activity possesses intentionality then it is *about* something, *refers to* or *relates to* some thing which is different from the act itself (Smith and McIntyre, 1982, chapter III, section 1.3). Instances of different types of representational activities would be looking at the bell in the distant tower, listening to

the bell pealing, remembering seeing that bell in the past, imagining seeing it again in the future, thinking it is the largest bell in the city, wanting to hear it toll the hour, intending to discover more about that bell. States of mind that are intentional or representative are brought into being and maintained in being through such mental acts (Armstrong, 1968, pp. 130–131). For instance, looking produces a sighting of the bell in the distance, listening results in the hearing of it peal, remembering causes a memory of seeing it, imagining brings about an image of it, thinking produces a thought of it, intending culminates in an intention, wanting produces a state of wanting, etc. Though acts of mind and the mental states they produce, that are *in respect of* or *apropos* something other than themselves, are obviously quite common in the life of the psyche, not all acts/states of mind are intentional. For example, the “raw” sensations out of which perceptual representations are constituted are not about something distinct from themselves. Such relatively unstructured sensory presentations, though themselves a product of mental activity, gain “aboutness” through the further mental activity of being re-presented (or re-configured, re-arrayed) as a thing in the environment. Hence, a perceptual representation is *of* (in a non-intentional sense) the sensations that constitute it — the re-presenting is the re-ordering *of* those sensations. In an intentional sense, a perceptual representation is *of* a thing that is outside the mind.<sup>1</sup> The problem of the intentionality of the mental is precisely the problem of how such re-presenting gives object directedness to non-intentional presentations. Descartes and the Port Royal logicians who followed him in his “new way of ideas” regarded representation as an unanalyzable given or brute fact about ideas (Donagan, 1988; Gewirth, 1943). Contemporary philosophers of cognitive science are attempting to analyze and explain the workings of precisely this feature of the mental. Whatever may be the scope of the representational with respect to acts and states of mind, analyzing intentionality has proven to be particularly difficult due, in the first place, to the simple fact that intentionality is a relational property.

Relations are odd sorts of entities. According to traditional substance metaphysics, the relational property itself is to be distinguished from the “subject” of the relation, which is a substance standing in relation to the “term” of the relation, which is (a property of) some other substance. Hence, relations themselves fall within the metaphysical category of accident and

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<sup>1</sup>Other states of mind that are not intentional in this sense, that do not gain intentionality through their components being re-presented in such ways include moods and deep meditative trances (Q. Smith, 1981). It is worth noting that not all intentional states are also conscious states of mind. People still have beliefs about the world and intentions to reform it while they are fast asleep. The problem of the intentionality of the mental is not the same problem as the problem of consciousness.

accordingly have no being of their own, i.e., they depend for their existence on that of which they are a property (Wild, 1948, chapter 15, section 8, provides a modern gloss of this analysis). Intentional relations are doubly odd in that they can obtain between the subject of the relation and a “thing” that does not have real, i.e., extra-mental, existence.

Much has been made of this unusual feature of intentionality and much has been written about it (Brentano, 1874/1973, and Chisholm, 1967, are centerpieces; see also McAlister, 1976). I can hallucinate seeing and hearing a bell, I can think that unicorns are difficult to ride, I can believe that the fifth decimal determination of pi is two, I can remember visiting Ankor Wat, etc. Nonetheless, it seems that both the things that are related to each other and the features by which they are related must exist in order for any relation to exist since, as an accident, the being of a relation is utterly derivative from the being of what is related. It is this anomaly, that intentional relations are an exception to the rule that relations can obtain between physical things only if both the subject and the term actually exist, that seems to pose an insurmountable obstacle to conceiving the mind entirely in physical terms. In fact, Brentano employed this feature of intentional relations as the demarcation criterion between a realm of the physical and a realm of the mental (Brentano, 1874/1973, pp. 88–89). Other philosophers have been led by this aspect of intentionality to posit a trans-natural ontological status to the minds that are the subjects of such relations (Chisholm, 1967; and again, Haldane, 1996, 1997).

Be this as it may, both naturalistic and non-naturalistic attempts to explain how intentional relations can obtain with the non-existent make critical use of distinctions between the *content* of mental activities, the mental *objects* to which such activities are directed via this content and the *extra-mental things* which usually correspond to these mental objects (Gurwitsch, 1967, esp. pp. 127–131; see Smith and McIntyre, 1982, for an excellent correlating of Husserl’s phenomenological analysis of this content/object distinction with Frege’s semantical analysis of the same). Though different authors assign somewhat different meanings to these terms the general idea is as follows: the content of the mental activity is the form or pattern of the act, the specific order in which it occurs. Such an activity is goal directed and the end toward which it tends is (the beginning of) a mental state that is maintained in being by the continuance of that activity. This activity is ordered in such a manner by its content to result in a highly structured stable state — the structure of the constituting activity structures the state. An intentional state of mind then is the ongoing state of this tendential mental activity. Such activity is intentional precisely in the sense that it *tends* toward, has as its *objective*, is oriented to as to its *end*, this determinate state. More specifically, such activity consists in the re-presenting, re-configuring, re-arraying

or re-ordering of simple qualitative components.<sup>2</sup> These lower level components are not themselves intentional. At the higher levels of functional scale the activity of re-presenting these simple qualitative presentations is directed to and completed in a specific end state. And it is this terminal state that is the representation of an extra-mental thing. Be it noted that these terminal representational states are not things that exist independently of the representing activity — they are maintained in existence precisely by ongoing contentful mental activity by which they are brought into existence in the first place.<sup>3</sup>

For example, the constituting activity of perceptual states is the re-ordering or re-arranging, etc. of simple sensory qualitative sensations *into* a thing that is causing that activity, i.e., into a representation of whatever it is that is bringing about the representing act. My seeing of the bell is constituted out of visual sensings and the content of that constituting is the specific patterning of those shapes and colors. This reconfiguring results in a visual representation of the bell. My hearing of the bell is the re-configuring of pitches at intensities that results in an auditory representation of the bell. Different types of perceptions are simply specific orderings of qualitatively distinct types of sensings.

In short, the intentionality of perceptual mental activity is this relation between content of mental act (pattern of reconfiguring activity) and mental object of act (completed reconfiguration). Thus, and strictly speaking, the intentional relation does not obtain immediately between a subject substance and a feature of some other substance, but between an activity of the subject and a state (of the subject) produced by that activity. In terms of traditional substance ontologies, then, this relation holds between two accidents of the same substance (cf. Chisholm's analysis of intentionality, 1967; see also Kim, 1997, and Manfredi and Summerfield, 1997). However, in any analysis of intentionality carried out within the parameters of a realist ontology, representing activity actually does intend some extra-mental reality (Deely, 1982, contains an exhaustive and exhausting overview of medieval realist semantics; Sayre, 1997, contains a contemporary rendition). According to realist conceptions, a mental state maintained by ongoing re-presenting activity perceptually represents an extra-mental thing insofar as that state (of

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<sup>2</sup>These qualitative components of the intentional mental act may in turn consist of configurations of (qualitative) elements at a lower level of scale. This reductive procession, of complex patternings of simple elements that are themselves complexes of simples, ends at a lowest level of functional scale of mental activity the content of which consists in patterns of irreducible (in consciousness) qualities (the Churchlands, 1998, essay 11, argue the definitive case for this conception).

<sup>3</sup>Hence, the object is said to have "inexistence" or existence in the intentional activity of the mind (Spiegelberg, 1976, for explication of "intentional inexistence;" but Marras, 1976, and Sorabji, 1991, strongly criticize Spiegelberg's explanation).

reconfigured sensations) *corresponds to* that thing or to some set of its properties.<sup>4</sup> The intentionality of the activity reaches through, as it were, the mental state to the extra-mental reality because and to the extent that the state correlates with that real thing. An illuminating analogy is the painting by an artist of a portrait of a person. The act of painting is a re-arranging of paints (re-presenting) that is ordered by its form (the content of the activity) to the completed portrait (object of the activity) of the person (the real thing that the representation represents). The portrait is of a real individual only insofar as there is some measure of correspondence between the way in which the paints are arrayed on the canvas and features of the person. The analogy would be closer to what occurs in perception if the portrait could only be maintained in being by continuous painting activity. In any event, a mental act that enjoys such correspondence thereby mediately refers to an extra-mental reality and an intentional relation obtains between a feature of one substance and (a feature of) some other substance. However, it obtains in this way only in veridical intentional states.

If I really do see the bell in the distant tower, the re-presenting of my visual sensations is directed upon and maintains a state (configuring of visual sense qualities) that really does correspond closely with a thing that really does exist independently of my mind and, accordingly, my seeing is of that thing. When the term of a mental act does not correlate with anything extra-mental then the intentional relation obtains only between content and object (act and state) within the mind. If I am hallucinating in “seeing” a

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<sup>4</sup>This correspondence was understood by Aristotle to be an identity relation between the knower and the known extra-mental entity (a “wide content” conception of representation). When a knower is conscious of (the properties of) some thing, then this identity relation is a formal isomorphism — a form instantiated within the soul or mind (the form of the body) is the same as the formal property existing outside the mind. Though this form is in the subject, it is not the form of the subject. It is carried in/by the mind as the form of an other (De Anima III, chapters IV and V). The whole problem of explaining intentionality is to explain how such a form is carried as the form of something else. Contemporary cognitive scientific interpretations of the mind’s activity in information theoretic terms employ essentially this Aristotelian conception (Sayre, 1976, and Dretske, 1981, are quite explicit about this; cf. Dechert, 1965, for an account of the relation between Aristotle’s formal cause and Shannon’s information theory; see also D.M. Mackay, 1980). It is important to note that the isomorphism between mental states and real things admits of degree. Mental objects correspond *more or less* with things outside the mind. The measure of this correspondence would be subject to selection — only as much isomorphism between objects and realities *as would be needed to behave effectively vis-à-vis those realities* would be selected for over the evolutionary history of any type of cognitive organism. Hence, organisms are aware of, bear information about, only select properties of the entities that matter most to them. It is also worth noting that, with respect to this conception of intentionality, the real things mental activities are about could be physical entities in the immediate environs of the conscious organism or Platonic noetically existing universals. With respect to theories of mind, realism entails that the objects of mental activities (can) correspond with and therefore be about entities that exist independently of those mental acts, whether those extra-mental things have physical or immaterial ontological status.

bell in a distant tower, the representing activity terminates in a state (the same kind of state as in the veridical case) to which no extra-mental reality corresponds. Hence, whatever it is that I am conscious of when I hallucinate, it is not an extra-mental thing — I am not (really) seeing any thing. Analogously, a concave mirror in a carnival fun-house makes me attend to a distorted *image* of my body. I am aware of the image — I am not seeing my real body. However, when I look into the bathroom mirror to ascertain whether or not I have cut my face and I see blood on my face then the object of my seeing activity really is the blood on my face. I am aware of the blood and not of an image. When a subject is aware of the fact that the object of her mental act does not agree with extra-mental reality, that mental object itself can become the object of other higher order acts of mind. Such reflection serves the purpose of bringing about concordance between the object of the lower order act of mind and the extra-mental thing. The upshot of all this, in terms of metaphysical realism, is that intentional relations with the non-existent obtain only in the sense that patterns of mental activity terminate in a (mental) state to which no extra-mental thing corresponds. Non-veridical intending is only this relation that obtains between mental activity (representing) and mental state (representation). Now, in both veridical and non-veridical representational states, the content of the mental activity producing that state must be directed to its object *in the proper manner*.

This directing of the act (with its content) onto the state (which is the immediate object) is referred to, in the phenomenological tradition, as “fulfillment” or “satisfaction” of the mental act and, in the analytic tradition, as “direction of fit” of the act (Searle, 1983, *passim*, and 1998, pp. 100–106). Speaking metaphorically from a first person perspective, in perception the world is experienced as streaming into my self, the subject of perceptual mental activities. Searle characterizes this tendential vectoring in perception as follows:

... perception is an intentional and causal transaction between mind and the world. The direction of fit is mind-to-world, the direction of causation is world-to-mind and they are not independent, for fit is achieved only if the fit is caused by the other term of the relation of fitting, namely the state of affairs perceived. (1983, p. 49)

The thing outside my mind in fact causes my perceiving, instead of something else causing some other mental activity, and the thing causes my perceiving of *it*, rather than of something else. If that thing did not cause me to perceive it then I would simply perceive something else or not perceive anything at all. Furthermore, the thing perceived is perceived as *causing its perception*, as effectuating the perception of it. If one was not conscious of the thing perceived as causing one to perceive it then either it would appear in/to consciousness as the effect of mental activities (as do the objects of

imagining) or as neither the cause nor as the effect of mental action (as do no objects of awareness). Both of these possibilities contradict the phenomenology of perception and the phenomenal differences between perceiving and other types of mental activities. Hence, a perceptual representation *befits* a real thing and the real relation between it and the mental activity that it causes only if the fact that the thing is causing the organism to represent it is somehow contained within the representation. This means that not only must the mental object be coincident with the real thing in order for the mental act to reach through the mental object and refer to a real thing, but the mental object must be coincident with the very relation between the extra-mental thing and mental activity that it causes. In this way, the directing of the mental activity by its content upon its specific object (which is, again, the terminal state maintained by the activity) accomplishes reference to the real thing causing that activity *as to its cause*.<sup>5</sup> And, this is how a form in the knower is carried *as* the form of some thing other than the knower. Note that this does not mean that sensations are consciously categorized (or schematized or framed) as being in such causal relations. The form of the cause-effect relation is simply contained within the very object of mental activity. Thus it is that intentional states of mind can be brought about in creatures that are aware of their environs yet have no concept of causality. Adult humans become aware of the fact of direction of fit, and of intentionality as such, only in higher-order reflection on lower-order intentional states (more of this later).

Perception is veridical when mind-to-world direction of fit obtains because the mental act is fitted to its object as to its cause *and* a real thing actually causes the act. Misperception will occur when mental activity which still has content directing it upon an object as upon its cause, either is not brought about by a real thing (with which the mental object would be isomorphic were it to exist) or is not brought about in the correct causal manner (the thing is present in the environs yet is not the cause of the ersatz perceptual mental activities). As an example of the first type, Macbeth sees the dagger before him and knows there is no dagger there to cause such visual sensations since he cannot touch it. For this reason he infers that something else is causing these visual sensations. A case of the second type of misperception would occur if I heard the phone ringing and it really was ringing though its

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<sup>5</sup>Cf. Kant's (1787/1973, B 208, p. 201) explanation of the "anticipation of perception:" "Appearances contain in addition to intuition the matter for some object in general (whereby something existing in space and time is represented); they contain, that is to say, the real of sensation as merely subjective representation, *which gives us only the consciousness that the subject is affected, and which we relate to an object in general*" (my emphasis). So, to the question, "What's it like to be an effect?" the response would be that "It is to bear a property that is *directed upon* a thing as the cause of that property, i.e., it is to bear a perceptual representation."



ringing was not causing those auditory sensations. In such a case I would not realize that something else was causing the ringing in my ears, unless, let us imagine, it continued after I picked up the phone. In both types of misperception, one still perceives the hallucinated object as cause of the (hallucinatory) perception. In fact, direction of fit is precisely what accounts for hallucinated objects seeming to be so real and for hallucinating to be so disturbing.<sup>6</sup>

Direction of fit characterizes all types of intentional mental activities. By reflectively comparing the intentionality of different types of mental activities we become aware of direction of fit as such and come to realize that there are basically two different types of direction. In appetitive acts such as desiring or willing, the direction of fit, its tendential vectoring, is the reverse of what it is in perception. Again speaking metaphorically from the first person point of view, my own conative mental activities are experienced as streaming out into the world from me the subject of the activity. The world is made to fulfill the act, is being fitted to the act, and is so *by the act* (Donagan, 1987, chapter five). The course of action I choose is brought about by my *choosing* instead of not choosing any action and by my choosing that *specific course* instead of some other. A volitive representation (a representation of an action that causes the action) befits this causal relation in the sense that the chosen behavior, what I choose to do, I choose *as* effectuated by my choice. "Phenomenally, the act of willing appears precisely not as an occurrence caused by a different agent but as an initial act of the ego-center itself" (Pfander, 1967; cf. Von Hildebrand, 1953, part two, section II). Hence, in volition, direction of fit means that the mental act (by its content) tends toward the object *as to its effect*. And this means that the choice or conative representation must be correspondent with the behaviors chosen *and with the relation itself* between those behaviors and the mental activity of choosing them.<sup>7</sup> In the case of a "deviant causal chain" (the parallel in volition to the

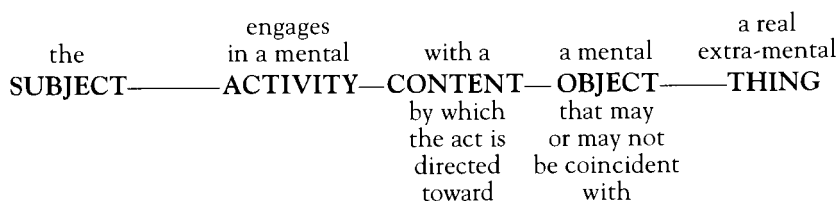
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<sup>6</sup>Intentionality is especially adaptive precisely because of direction of fit. Organisms capable of bearing states that have brought them into intentional relations with things outside of themselves (or with themselves) have been selected for over organisms that could not bear such states. Internal states which model the causal relationship between those very states and the things which cause them confer on their bearer the ability to become conscious of *how things appear* as such instead of merely being conscious of things in the environs. This in turn enables the bearer to alter how things appear instead of merely altering things and to be conscious of *mis-perception* as such. This then confers on the bearer the capacity to compensate for misperception. Accordingly, humans have constructed devices to correct for and greatly extend their own powers of sensation.

<sup>7</sup>To the question, "What's it *like* to be a cause?" the response would be "It is to bear a property that is *directed upon* a thing or behavior *as upon* the effect of that property, i.e., it is to bear a conative representation." Cf. Kant's (1798/1978, p. 155) definition of desire as ". . . the self definition of the power of a subject to imagine something in the future as an effect of such imagination."

second type of perceptual misrepresentation noted in the preceding paragraph) I still choose the action as the effect of my own choosing activity, i.e., *behavior of mine initiated by me* is the object of my choice. That is why the action seems to me to be my own. Nonetheless, when the cause of the behavior is deviant the action does not actually occur by my choice and instead is caused by something else (Davidson, 1973; Donagan, 1987).

All of these characteristics of the intentional relation can be summed up as follows. The intentionality of the mental consists essentially in the tendential directing of mental acts toward their objects which are the mental states sustained by those acts. When this end state corresponds to a real extra-mental entity and to the causal relation between that thing and the activity sustaining the state then there is an intentional relation between that activity and the real thing. When there is no such real extra-mental entity or there is no such causal relation and yet the mental activity is directed toward the same end state that would result if there really were such an entity actually causing or being caused by that activity then the intentional relation obtains merely between the mental activity and that mental state. Specific patterns (contents) of re-presenting activities direct them into specific representational end states (objects) and specify whether the intentional relation is passive, as in perception, or active, as in volition. It is worth noting that mental activities which have this content-object direction of fit constitute only part of the fundamental phenomenological structure of experience in general. Experience of an object is also always *by a subject*. The fact that representational mental states are someone's, is the "subjectivity" of the mental. The general scheme of all experience then is as follows.<sup>8</sup>



<sup>8</sup>The subject pole of this structure has been variously interpreted, e.g., by Cartesians as an individuated disembodied substantial soul, by Humeans, Buddhists and some post-modernists as an illusion, by Kantians as merely phenomenal, by German Idealists as a transcendental ego. Aristotelians interpret the subject as an individual existing physical substance engaging in mental activities which are among its accidents and which are productive of its own intentional states. This subject-substance is an ontological composite of formed-matter. Contemporary cognitive scientists combine the Kantian and Aristotelian interpretations. The phenomenal subject of experience is the representation of the very thing that is doing the representing, i.e., is the model of the overall activity of a (human) nervous system that is caused by and carried within that very nervous system (Johnson-Laird, 1983). Very good phenomenological analyses of subjectivity are in Crosby, 1996, chapter three, and Davis, 1989.

Examples of intentional acts such as those mentioned early in this section can be readily fitted into this scheme — “I” see the bell, “I” hear the bell, etc. The subject itself is brought into (intentional) relation with a real thing by the content of its own mental activity when the object of that act (or state of the subject) is sufficiently isomorphic with the thing. For instance, in visual perception the thing is sighted by the subject via complexes of her own visual sensory activities. The particular pattern of re-configured sensations is what moves the subject of those sensations to take them as the thing that causes them.<sup>9</sup> If such configurings of sensations occurred, without being “of a subject” (or without being of the proper type of subject) then they could still be representational and directed upon an object which was coincident with some extra-mental thing. Such an act and resulting state would just not be intentional for *anyone* (cf., Dretske, 1995, section 5).

### Recent Analyses of the Nature of Intentionality

Over the last three decades cognitive scientists and philosophers have made real progress in elucidating the inner workings of intentionality. These researchers have tended to restrict their analyses to perceptual mental activities. Furthermore, they all emphasize different aspects of the intentional relation and consequently have all specified different requirements for a mental state to be intentional. In fact, a good portion of their efforts have consisted in attempts to find counterexamples to each other's postulated requirements. In other words, these researchers often try to characterize states that clearly are intentional yet lack the feature that some one of them has stipulated as necessary for intentionality. Or they characterize states that, though they possess this specified feature, are clearly not intentional (again, see Haugeland, 1990, for an overview). In spite of this disputational character of the research, the central tenets of these various approaches neatly complement one another and constitute, en masse, a rich explication of intentionality. In terms of the amalgamation of these conceptions, perceptual intentionality is at root a type of relation that obtains between (complex) physical systems. More specifically, in acts of perception the subject of the intentional relation is a pattern of nerve cell activity and the term of the relation is some thing

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<sup>9</sup>In semiotic terms, the subject of the sensations is the “interpretant,” the configuration of sensations is the “sign” and the thing that causes the sensations and is sighted via them is the “object.” Associated sensations that function in this triadic manner are “dicentric indexical qualisigns” in Peirce's classification (Deely, 1982, pp. 93–106; Liszka, 1996, chapter 2). In scholastic terminology, the pattern of configured sensations is *that by means of which* (the *id quo*) the thing is seen by the subject and is not *that which* (the *id quod*) is seen by the subject (Marras, 1976). If the subject is hallucinating, the sensations are that which is seen, or more appropriately, that of which the subject is conscious (though not as hallucinatory, if she is unaware of the fact that she is hallucinating).

in the environment of the organism. Using concepts fundamental to the information theoretic conception of human psychology, Sayre characterized this basic relation as follows:

In visual perception . . . the relationship of intentionality is quite literally a relationship of high mutual information between a set of objective circumstances and a representation in the cortex of the perceiving system. The representation picks out that particular set of circumstances by virtue of its being the only object in the perceptual scene with which the representation shares that relationship. Through such a representation the organism's perception is directed upon a specific object, which is thereby the object to which the representation refers. By sharing in its particular structure, the representation is true of the corresponding object. (Sayre, 1986, p. 136; cf. Sayre, 1987)

In brief, one state represents or is about another state only if there is a *relation of high mutual information* between the two states (a "wide content" conception of meaning, if one state is of the nervous system and the other is of some entity outside the nervous system). In the mathematical theory of information, high mutual information obtains between two ensembles the elements of which are related by a set of conditional probabilities that are (1) "deterministic," i.e., each element of an ensemble is uniquely related to an element of the other and (2) "absent equivocation" with respect to each other, i.e., each element is always related to the same element of the other. This mathematical refinement of Aristotle's notion of the formal cause is deployed here to explicate the correspondence relation between an intentional mental/brain state and (properties of) the thing that the mental/brain state is about.<sup>10</sup>

In his further development of this externalist conception of meaning Dretske emphasized that information at a location is about information at some other specific location only so long as the correlation between the information at each is *strong enough*. There is some degree of informational correlation (formal isomorphism) between any two states of affairs. Dretske

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<sup>10</sup>It should be noted that high mutual information is only one way of more precisely explicating this correspondence between an intentional mental state and its extra-mental referent. Comparable conceptions in other branches of mathematics, presumably, could be used to explicate the relation in terms of parallelism of structure. For instance, in topology the relation between two geometrical forms is *homeomorphic* (they are topologically equivalent) if there is a function that maps all elements and relations between elements of one structure onto elements and relations between elements of the other. In set theory, two sets are *ordinally equivalent* if each member of a set can be matched to a member of the other set, the matching is one to one and the matching preserves the order among the elements. These are three different ways of specifying the relation between two wholes in terms of the totality of identity relations between the relations between their parts. In the most general sense then, an intentional relation between a mental (or brain) state and some extra-mental reality is the totality of identities between the relations between components of the mental state and the relations between the components of that thing.

argued therefore that the correlation between the information at a structure in the nervous system and the information at a state of affairs in the environment must be perfect in order for the neural state to be semantical or representational (but see note three). The strength of the correlation distinguishes the intentional relation from all other correlations (Dretske, 1981, chapter 3, "a semantic theory of information").

Fodor demonstrated that this relation of high mutual information between states must be of the proper causal sort in order for one state (of mind/brain) to be about the other (state of affairs in the environs). There may be high mutual information (perfect informational correlation) between a mental/brain state and any number of other states of affairs. Thus, if such informational correlation sufficed for a mental state to refer then a state would be about each of the myriad of things with which it enjoyed high mutual information. This came to be known as the "disjunction problem" — if correlation alone sufficed for intentionality then a state 'M' that was about 'x' would also be about 'x or y' and about 'x or y or z', etc. since the correlation between 'M' and 'x' is the same as that between 'M' and 'x or y', etc. Fodor solved this problem by pointing out that an intentional relation obtains between highly correlated states only if one state is *actuated* or *brought about* or *efficiently caused* by the other. Without some such actual causal connection, any informational correlation could be entirely incidental, a mere coincidence. Thus, a relation of efficient causality must overlay, as it were, the relation of high mutual information in order for a mental state to represent or to be about some other thing (Fodor, 1984, 1987).

Millikan has drawn attention to the *evolutionary origin and adaptive role* of high mutual information between structures within an organism and the structures in its environment that cause them. In her terminology, the "stabilizing proper function" of "inner terms" (or states of mind) is to bring their bearer into proper functional relations with external states. Inner terms acquire, over time and through mechanisms of selection, such functional effects for a type of organism. To put the point differently, a state within an organism is selected for insofar as (1) it has high mutual information with a specific state of the environment that causes it *and* (2) formal correlation and effectuation adapts the organism to the environmental state (and, of course, it is vital to the survival-onto-reproduction of the organism that it be so adapted).<sup>11</sup> Such behavioral adaptation occurs because the specific state of affairs in the environs causes the mental state to occur (efficiently), causes it to be the specific state that it is (formally), and because that mental state causes behavioral responses on the part of the organisms vis-à-vis the envi-

<sup>11</sup>Millikan does not formulate her position in information theoretic terms, but cf. Dretske, 1981, chapter 9, and Sayre, 1976, pp. 239–243.

ronmental state of affairs. Selection occurs at each of these stages. So, those organisms will have fewer descendents which fail to be effectuated by that state of affairs or which, though they have mental/brain states caused by that state of affairs, have a lower information correlation with it or which, though they have high information correlation with the state of affairs in the environs, do not exhibit beneficial behaviors with respect to it. However, selection is never for the “best,” but always only for what is marginally better. Consequently, there is “adaptational slippage” and inner states and correlations and behaviors that are merely slightly more adaptive than others may be selected for (Papinau, 1993). Millikan’s point is that a neural state can become intentional for an organism, i.e., an inner state can be about some external state of affairs, only after a *sufficient measure* of this functional adaptation has been achieved (Kappner, 1999; Millikan, 1984, chapter 6 on “intentional icons” and chapter 15 “the act of identifying”; Papineau, 1984).

The Churchlands importantly contributed to the understanding of representation in their attempt to explain intentionality entirely in terms of the functional role of mental acts and states vis-à-vis other mental acts and states of mind. As Paul Churchland (1988) succinctly explains this “functional semantics”:

. . . purely physical states such as brain states might possess propositional content, and hence display intentionality. Having content or meaning, it seems, is just a matter of playing a specific role in a complex referential/computational economy . . . . The first [lesson] is the idea that since meaning arises from an item’s place in a network of assumptions, and from the resulting conceptual role that the item plays in the system’s ongoing inferential economy, therefore our mental states can have the propositional contents they do because of nothing more than their intricate relational features. (pp. 63, 66)

Such is the essential element in all internalist or “narrow content” conceptions of meaning. The intentionality of the mental is its internal functionality — a mental act is referential in that it produces a state of mind that brings about other acts/states of mind and is itself brought about by other acts/states. What a representational state is specifically about is simply the specific set of other acts which the (representative) state leads to.

Since none of these narrow or wide conceptions of meaning seems to be sufficient by itself to characterize the intentional relation, it seems reasonable to attempt to combine them. Such an amalgamation of the requirements on perceptual representation would run as follows:

A state or activity of an organism is about a thing in its environs if high mutual information obtains between that state and the thing, the state is caused to occur by that thing via the mediation of other activities within the organism and the state leads to

further inner states of the organism that in turn lead it to behave adaptively with respect to the thing.<sup>12]</sup>

A major problem with conceiving intentionality in these terms has been the explanation of failure of reference. In what sense does an intentional relation so understood obtain between mental/neural states and some thing that does not exist? A man suffering delirium tremens hallucinates in seeing the mouse in the plasma bottle suspended above his hospital bed. His seeing is surely intentional, yet his inner state surely does not have high mutual information with any thing in the environment. Dretske articulated the obvious explanation — failure of reference occurs because the state occurring in the organism, though *normally* brought about by and highly correlated with something in the environs, on this occasion has not been brought about by that thing (Dretske, 1981; Fodor, 1987, proffers a similar account). The high mutual information between a thing and some state in the organism that the thing usually causes is built up over a period of time. Dretske calls this the “learning period.” It spans a segment of the life of the individual or, as Millikan would add, of the life of the species. When the learning period is completed, then, the efficient causal action of the thing on the sense organs results in the occurrence of a state within the organism which enjoys high mutual information with an environmental state of affairs. However, if *something else* efficiently causes the state within the organism when that thing is not present in the environment acting on the organism then the organism will behave in the same way it does when it is actually present in the environs. On such an occasion, though an information state in the organism has been brought into being by some thing, that state does not have high mutual

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<sup>12]</sup>In contradistinction to this individualistic interpretation of intentionality, some philosophers have argued for a social understanding of intentionality. Haugeland cites Martin Heidegger and Wilfred Sellars as modern proponents of this Kantian idea that certain social practices are needed to make mental states be about environmental states of affair — Kant defines objectivity as intersubjective or universal validity (Burge, 1979; Dummett, 1974; Haugeland, 1990). This can be understood simply as extending the functional role of states of the organism to include *functional relations between them and the internal states of other organisms*. The high mutual information that constitutes the basis of the intentional relation would then obtain between the inner state of an individual and some thing in the environment only if that inner state were properly related to the inner states of other individuals. For example, an individual monkey is set to chattering in a certain way when something in its environment causes certain visual sensations, yet it *sees the leopard* only when it hears enough of its neighboring monkeys chattering in that same way (i.e., as caused in them by the same sort of visual sensations). The individual monkey’s internal state is a representation of the leopard only insofar as that state is functionally connected with the internal states of the other monkeys (as well as other of its own internal states) as mediated by their behaviors. Robert Brandom (1994, 2000) is the current champion of this conception of intentionality. The amalgamated account outlined in the text could readily incorporate such social factors.

information with this unusual efficient cause. Accordingly, *pace* the Churchlands, the internal inferential economy of the organism will operate in the same way it does when the usual thing is present and acting on its sense organs. This is a commonsensical and realist analysis of how failure of reference occurs in perception (and as Fodor insists, apparently in spite of his methodological solipsism, must be basically correct). It can be deployed to explain hallucination, the distinction between delusion and hallucination, and the distinction between failures of reference that are known to the agent and those that are not. Nevertheless, it can also be deployed to highlight one critical inadequacy of this amalgamation of the various conditions of representation.

A visual hallucination seems so real because that which one “sees” is seen as causing one to see it, i.e., the representation has the same direction of fit that occurs in veridical seeing. Yet according to the amalgamated naturalistic conception of representation outlined above, an hallucinatory sighting is only a state of the organism that would have high mutual information with some external state of affairs that would normally cause it and on the basis of which the organism would behave more or less adaptively with respect to the state of affairs, if the state of affairs actually obtained (this is the crux of Loewer’s, 1987, criticism of Dretske’s account; see also Fodor, 1984, and Searle, 1998, p. 91). What is missing is precisely direction of fit. The amalgamated account of intentionality fails to account for that which makes a state carried in the organism *be as another thing*. Perceptions intend the things that cause them, or are about that which causes them, *as that which causes them*. Yet the consolidated explication of the nature of intentionality in no way accommodates this essential aspect of referring. There is no feature of the state of an organism — which is caused by some thing in the surroundings of the organism and which has high mutual information with that thing, etc. — which renders the state *in itself* to be that other thing causing the very state.

This lacuna vitiates not only the account of veridical perception, but also non-veridical perception. Macbeth is hallucinating, but his seeing has direction of fit in that he sees the dagger as causing him to see it. Furthermore, even though he knows that no dagger is really there to cause his seeing of a dagger, that knowledge does not change his perception, he still sees the dagger as the cause of his seeing of the dagger. And that is why he is so confused — normally when he sees a weapon, his seeing of the weapon is caused by the weapon he sees. In the abnormal case, and in spite of his efforts to shake it off, he still sees the dagger as the cause of his seeing it. In order for a perceptual mental state to represent a thing in this way, it must represent the thing as causing the representation of it. Direction of fit must be built into, so to speak, the representation. Thus, the consolidated account of intentionality needs to be appended to account for direction of fit (in perception) as follows:



A state of an organism is about a thing if and only if high mutual information obtains between the state and the thing, *and between that state and the relation between (the activity that produces) the state and the thing that causes it* and the state leads to further inner states of the organism that in turn lead it to behave adaptively with respect to the thing.

Mental activity can bring about this additional isomorphism or high mutual information if it produces a mental object the components of which are related to each other in the same way in which the real extra-mental entity is related to the mental act that it causes. The next section of the paper explicates how a perceptual representation can enjoy high mutual information or be isomorphic with the relation between itself and its very cause. In other words, it explains how direction of fit obtains in perception.

### The Modeling of Causality in the Association of Sensations

The perception of one extra-mental entity as causing a change in some other extra-mental thing requires, at the least, that the sensations caused by each thing be related in the proper manner (association by constant conjunction or concomitant variation, etc.). In the same way, the perception of a thing as causing its very own perception requires that the different types of sensations caused by the thing be associated in a very specific manner. There are three elements in this association pattern that constitute the causal aspect in perception. First, the ordering of the sensations parallels the fact that the mental state (of perception) is distinct from the extra-mental thing (causing that state via its causing the mental activity producing the state). Second, this same patterning of sensations parallels the fact that there is a causal relation between the thing and the sensations of which the perceptual state consists. In short, the pattern replicates a causal form. Third, the structure of the association models the fact that in this causal relation the extra-mental thing is the cause and the sensations are the effect. For ease of exposition, the explication of these three aspects is restricted to a simple case of seeing a thing (in the final section of the paper extrapolations of the account are proffered).<sup>13</sup>

Suppose that I look at a small cube held by me at arms length. The cube simultaneously causes visual and tactile sensations (two different patterns of different types of simple sensory qualities). Furthermore, as I manipulate the cube with my hand, both the visual sensations and tactile sensations undergo

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<sup>13</sup>Also for the sake of ease of exposition, the account is formulated in terms of metaphysical realism. Nothing in what is described can be used to prove the existence of things independent of our experience of them. However, elucidation of the essence of intentionality should not be expected to solve the metaphysical and epistemological problem of solipsism.

change. During these manipulations, tactile sensations  $T(m,n,o)$ , e.g., torque, smoothness, etc., that are caused by the cube come to be associated with visual sensations  $V(m,n,o)$ , e.g., color, shape, etc., that are caused by the same cube. Each element of one mass of sensations always occurs together with an element of the other mass —  $T(m)$  always occurs at the same time that  $V(m)$  occurs,  $T(n)$  always occurs with  $V(n)$ , etc. When one (pattern of) mental activity is associated with another (pattern) in this way then the occurrence of one activates or primes for activation the other. In short, a mutually conditioned relation is established between the two.<sup>14</sup>

As is evident, associational relations such as these are established between patterns of mental activity at different levels of scale. It was just noted that the simple or “atomic” sensation of touch  $T(m)$  caused by the cube comes to be associated with another simple sensation of the same type  $T(n)$  and/or of a different type  $V(m)$ . This results in whole masses of sensations of the same and different types, all caused by the same thing, being associated —  $T(m,n,o)$  is linked with  $V(m,n,o)$ . It is these mutually conditioned masses of sensory activity that function as whole units of further mental processes, i.e., the associational mass precipitates or primes for activation other mental acts. The individual sub-activities that make up the association or stand in the mutually conditioned relations are not functional units at this higher level of scale — they coalesce into a unit that so functions. At any of these levels of scale, conditioned relations are built up during periods of time that vary in length over the life of the individual organism or over the life of the species (which are then inherited as innate dispositions of the sensory capacities).

To return to the example of the cube held in my hand causing visual and tactile sensations, some of these tactile sensations  $T(a,b,c)$  are not directly associated with any visual sensations and some of the visual sensations  $V(x,y,z)$  are not directly associated with any tactile sensations. For example, many of the pressure sensations caused by the cube are not associated with any specific visual sensations and many of the color sensations caused by the cube are not associated with specific tactile sensations. There is not a one to one correspondence between the elements of each distinct type,  $T(a)$  is not

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<sup>14</sup> Various articulations of how this mutual conditioning occurs (the “binding problem”) have been developed over the centuries. Aristotelians account for the unifying of sensory activities as due to a specific mental power, the common sense. Empiricists have ascribed it to mechanical associating. Kant argued transcendently that the unifying of the sensory manifold is ultimately brought about by a synthesizer that transcends possible experience. My account further explicates the empiricist analysis. It is pertinent to the Kantian conception of the way in which sensuous intuition must be spatially and temporally structured in order to be schematizable by the categories of the understanding (Gordon Nagel, 1983, demonstrates that Kant’s conception of mental functioning presupposes the empiricist account of association of sensation). As far as I can tell the neurophysiology of this synthesizing is understood in its rudiments (Baars, 1988; Barker, 1991; Crick and Koch, 1990).

associated with  $V(x)$  or with  $V(y)$  or with  $V(z)$ ,  $T(b)$  is not associated with  $V(y)$ , etc. This means that sensations of one type may change while sensations of the other type remain constant — any of  $T(a,b,c)$  may alter with no change in any of  $V(x,y,z)$  and vice versa. Nonetheless, these independent sensations are associated with other sensations of the same type,  $T(a,b,c)$  is associated with  $T(m,n,o)$  and  $V(x,y,z)$  is associated with  $V(m,n,o)$ . It follows that in spite of the lack of exact one-to-one correlation between all of the visual and tactile elements, the set *as a whole* of all the associated tactile sensations,  $T(a,b,c)$  and  $T(m,n,o)$ , is closely associated with the set *as a whole* of all the associated visual sensations,  $V(x,y,z)$  and  $V(m,n,o)$ . The combined set of all these associated sensations contains a sub-set consisting of visual and tactile sensations the elements of which are associated, i.e.,  $T(m,n,o)$  and  $V(m,n,o)$ , and contains another sub-set consisting of different tactile sensations  $T(a,b,c)$  the elements of which are not so associated with any specific visual sensations.

Now, it is precisely this lack of exact correspondence between all of the elements of the two different kinds of associated sensations (which are all caused by the extra-mental thing) that parallels the distinction between visual sensation and thing causing those sensations. This thing is different from the visual sensations that it causes — that is just what “extra-mental” means. This means that there is “more to my seeing than meets the eye.” The parallel to this distinction in the form of the associated sensations is simply that there are elements of the set of tactile sensations  $T(a,b,c)$  which are not associated with distinct elements in the associated set of visual sensations. There is *more to* the seeing activity as a whole in the sense that there are specific sensations of touch  $T(a,b,c)$  that do not correspond *specifically* with visual sensations.<sup>15</sup> To reiterate, the sets of associated visual sensations  $V(x,y,z)$  and  $V(m,n,o)$  are linked with the sets  $T(a,b,c)$  and  $T(m,n,o)$ , but the elements of  $T(a,b,c)$  are not linked with any specific elements in the mass of visual sensations. Of course, this also means that there is *more to* my touching in the sense that there are distinct visual sensations  $V(x,y,z)$  that are not associated with distinct tactile sensations. If each of the elements in the set of all visual sensations were precisely associated with an element in the set of all tactile sensations, there would be nothing “more” to either type of sensation and they would, in effect, constitute a single sensation. In such a case there would be nothing within the sensory mass on which to hang the distinction between sensation and thing causing sensation.

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<sup>15</sup>This is the basis of the “horizon” of experience in vision. As Husserl (1960) continually emphasized, intentionality is such that there is always more to what one experiences than is given in any experience (see also Ihde, 1986, esp. chapter seven; Smith and McIntyre, 1982, pp. 197–200).

So, in order for a state of associated sensations of one type to be the representation of a thing distinct from those sensations, they must be linked as a set with a mass of sensations of a different type and there must be a lack of exact one-to-one correspondence between elements in the two types. Though such a pattern of related sensings parallels the distinction between a thing and the sensations that it causes, in order for visual sensations to become intentional seeing, they must also be *directed upon* the thing. A thing seen is represented as the cause of its being seen. This means, at the least, that it is represented as changing concomitantly with changes in the sensations (it is causing). It is not merely that the representation changes concomitantly with changes in the real thing, but that the thing and these sensations are represented as so changing. This comes about because the associating of visual and tactile sensations contains a form found in any causal relation, referred to by Mill as "concomitant variation" (Cohen and Nagel, 1934, chapter XIII, contains a good discussion of concomitant variation and all of Mill's other methods for describing causal relations).

If I alter the orientation of the cube held in my hand by turning it about then both the tactile and visual sensations change — as the thing changes so too do the sensations. As noted, there is close association between some of these tactile sensations  $T(m,n,o)$  and some of these visual sensations  $V(m,n,o)$ . This means, for example, that changes in the torque sensations correlate precisely with changes in the visual shape sensations. Other tactile sensations caused by the cube,  $T(a,b,c)$ , do not vary in this associational manner with changes in the visual sensations. Nonetheless, those tactile sensations  $T(a,b,c)$  are still associated as a set with all the visuals and tactiles that are caused by the cube. In other words, though the elements of  $T(a,b,c)$  are not in mutually conditioned relations with elements of  $T(m,n,o)$ , those two sets of tactiles always occur together and occur with the visuals. Because there is this specific concomitant variation *within the total set of associated sensations*, i.e., between  $T(m,n,o)$  and  $V(m,n,o)$ , and because the causal relation is one of concomitant variation, it follows that the internal structure of the overall pattern of association [ $T(m,n,o)$  and  $T(a,b,c)$  with  $V(m,n,o)$  and  $V(x,y,z)$ ] has the same structure as a causal relation. In addition, the concomitant variation within the overall pattern of associations is the same as the concomitant variation between the extra-mental thing and the whole set of sensations that the thing causes. Hence, the very form of the associations parallels the form of the causal relation that actually obtains between the cube and all of the sensations that it causes. If none of the visual sensations were associated with tactile sensations that varied concomitantly with it then the total pattern of associated sensations could not exemplify this causal form and could not represent a thing as causing those sensations. As explained in the preceding paragraph, because the total mass of these two

types of sensations caused by the cube contains sets of sensations the elements of which are not associated with elements of other sets, the totality exhibits the distinction between thing and sensation. It is because this same total mass of sensations contains sub-sets of sensations *the elements of which are associated and which vary concomitantly*, that the totality exhibits the causal relation.

However, no component within the whole associational mass is related to any other component as the cause of an effect. This is the problem with all of Mill's methods for describing causal relations — none of them suffices to identify the cause and the effect in a causal relation. Concomitant variation between A and B does not by itself identify A as the cause and B as the effect, instead of B as the cause of A (Cohen and Nagel, *op. cit.*, contains a good overview of the limitations of Mill's methods). If the re-presenting or reconfiguring of the visual sensations that are caused by the cube was directed toward the object of that reconfiguring act *as to the effect of that act* then whatever was seen would appear as brought into being by the very activity of seeing. This is exactly how one's own willed bodily movements appear — one is aware of them as effectuated by the act of choosing. The problem then is to account for the manner in which the associating of visual sensations "vectors" those sensations upon a thing as upon their cause. Such directing is also constituted in the relations between sets of sensations within the mass of associated visual and tactile sensations caused by the extra-mental thing. Using the cube example, this can be explicated as follows.

Once again, the extra-mental cube causes visual sensations which come to be associated with tactile sensations all of which have been or are being caused by the very same thing. Some of these tactile sensations  $T(a,b,c)$  are not associated in a one-to-one matching with any visual sensations though they are always associated as a set with the visual sensations as a whole, i.e., with  $V(x,y,z)$  and  $V(m,n,o)$ . It is precisely the relation between these tactile sensations  $T(a,b,c)$  and those other visual sensations that parallels the relation between cube as cause and visual sensations as effect. If the (felt) thing is not there to cause visual sensation then no visual sensations occur — the subject cannot directly cause them to occur. The parallel to this conditional relation within the mass of associated sensations is that, if the set of tactile sensations  $T(a,b,c)$ , the elements of which are not in one-to-one association with any visual sensations, do not occur then the visual sensations do not occur either. The form of the associated sensations [ $T(a,b,c)$  with  $V(x,y,z)$  and  $V(m,n,o)$ ] then "supports the counterfactual," as it were. It is this simple dependency relation between sets of sensations that models the dependency relation between sensations and the thing that causes them. The cube *in my hand* causes me to see it, not the cube afar. The thing seen *and felt* causes the seeing of it.

Of course, I can see distant things not held in my hands (things not within the tactile field). However, this capacity depends on and derives from the association of vision with touch. If the things that cause visual sensations could not also cause tactile sensations, then none of those things would be seen as causing its being seen.<sup>16</sup>

To put this point otherwise, if a thing is seen and not felt then obviously there cannot be concomitant variations between visual and tactile sensations and when concomitant varying does occur then there is a dependency of the visual sensations on the tactile sensations. In this sense then the form of the association of sensations is isomorphic with the very direction of the cause–effect relation between the extra-mental cause of the sensations and those sensations. Accordingly, the thing that is seen and felt is seen as causing the seeing.

The whole point of this analysis of perceptual intentionality is that all of the features of the relation between the extra-mental thing and the sensations that it causes *that render that relation causal* are recapitulated in the relations between the different types of those sensations. First, the fact that the thing is *not the same as* the sensations that it causes is modeled in the difference between the tactile and the visual sensations (the cube seen and the cube felt, in the example). Second, the *efficient causal action* of the thing on the sense organs is modeled in the concomitant variations between the visual sensations and tactile sensations. Third, the dependency of the sensations *as effect* upon the thing *as cause* is modeled in the dependence of visual sensing upon tactile sensing (if the thing is not felt, it is not seen). Because complexes of associations model all this, the subject of those associated sensations perceives a thing *as* causing perception of it. When this directing of visual sensations upon an object distinct from those sensations is veridical, a real extra-mental thing that really is causing those sensations is sighted. In misperception, when reference fails, the same complex of associated sensations occurs, yet it is not in fact triggered or efficiently caused by the extra-mental thing. This *faux* state within the organism constitutes a model of a causal relation that in fact does not obtain. And this explains why, even

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<sup>16</sup>This is essentially the point that Locke and Berkeley made apropos the discriminative capacities of the blind man upon restoration of his sight. Since his new visual sensations would not be associated with his tactile sensations, both claimed that he would be incapable of visually distinguishing a cube from a sphere on the basis of distinctions gleaned from his tactile discrimination of them. Furthermore, he would not see things as distinct from him and as causing his visual sensations (George Berkeley, *An Essay Toward a New Theory of Vision*, sections 92–110, 132, 133 and *Three Dialogues Between Hylas and Philonous*, The First Dialogue; John Locke, *An Essay Concerning Human Understanding* II.ix.8; cf. Todes, 2001, appendix 1).

when one knows that one is hallucinating, the hallucinated thing still appears as causing one to perceive it. In spite of knowing better, the patterning of sensations maintains *an object* that is experienced (the difference in such a case being that no real thing is thereby perceived).<sup>17</sup>

### Three Objections to and One Support for the Account

First, it might be objected that this analysis of intentionality rules out such states in animals and young humans who either do not have the concept of causality or have not developed the use of such a concept with which to order their sensations. If the experiencing subject of a mental act, that has been caused in the subject by some thing in its environs, is incapable of subsuming that thing under the category of cause or of understanding the thing as the cause of its sensations, then it could not undergo intentional perception. However, it seems false that animals and children do not intentionally perceive their environments, yet they lack the concept of causality apparently required for intentional perception. In response to this objection, it should be noted that the same issue arises with respect to our grasp of causal relations between things around us in our environs. When I am aware of an event causing another I need not explicitly characterize the events as causally related, I may just be aware of one event and expect another to follow. Such anticipation need not be based on employment of the concept of causation. Empiricists will regard contingent association of sensations as fully accounting for our awareness of causality between things. Rationalists will take the contingent association of sensations to be merely a pre-condition of our awareness of causality, which involves a sense of necessity in the connection between a cause and its effect. Associated sensations have to be further framed in or schematized under the concept of cause in order for us to grasp a causal relation. This schematizing adds necessity to a relation already established by association. So, the question for this analysis of intentionality

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<sup>17</sup>This internalist analysis differs from the Churchlands' internalist functional account because the object directedness of a mental state is not a matter of its relations to other mental states on the same level of functional scale. Seeing is not intentional simply because it leads to other mental activities downstream or is caused by other mental activities upstream from it. In fact, it is the intentionality of the seeing that precipitates these other mental events. Object directedness arises in concatenations of mental activities which are at lower levels of functional scale and which are not themselves intentional. In other words, visual sensations and tactile sensations are not about anything distinct from themselves until they combine properly. The analysis is externalist because, *pace* Dretske and Fodor, a pattern of sensations associated in this manner corresponds to an extra-mental thing and to the causal relation between that thing and those associations (and, *pace* Millikan, that associational pattern leads the organism to behave adaptively with respect to that thing).

is whether or not more needs to be added to the association of sensations in order to make the form of that associating the same as the form of a causal relation. If more is needed, then sensations associated in the manner previously described would have to be subsumed under a category of cause in order for them to be intentionally directed upon their cause. In this case only creatures with the concept would be capable of intentional awareness of their environment (i.e., perception). However, sensations would still have to be properly associated in order to be so subsumed (that is Gordon Nagel's point about Kant's conception, see footnote 14). If nothing more must be added to the complex associations of sensations to produce awareness of causality then creatures without the schema of cause would possess intentional awareness of their environment. Hence, under either a rationalist or empiricist analysis, perceptual intentionality requires the association of sensations articulated in the previous section.<sup>18</sup>

Second, it could be objected that this account simply begs the whole question. In the example, touching the cube has an intentionality of its own — I touch and feel *the cube*. The cube feels as if *it* is causing me to feel as I do. If the intentionality of seeing the cube depends on the referentiality of touch then where did the intentionality of touching come from? In response to this objection it must be pointed out that the object-directedness of touch is built up by the association of sensations in the very same way as in the case of vision. I have access to whatever I touch from a multiplicity of approaches. I can touch the cube with this hand or with that or can make the cube touch various parts of my body, etc. These sensings can be associated into complexes, the structure of which parallels the distinction between thing and sensation and the causal relation between them. In this way tactile sensings, too, become intentional or representational.

Third, it could be objected that the construal is quite at odds with the phenomenology of vision. If visual and tactile sensations must be associated in this manner in order to give intentionality to visual sensation, then, when I see, I should feel too. Yet surely I do not have tactile sensations when I see things (unless there is something unusual about my "common sense" power as occurs in the synaesthesias). The immediate response to this objection is that this is exactly how we see things and the purported flaw in the analysis

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<sup>18</sup>Adult humans who reflect upon their own acts of perception can make themselves explicitly aware of the causal form contained therein. It is actually possible to de-intentionalize, so to speak, one's perceptions by such acts of reflection. For instance, an artist may focus on a scene as a two-dimensional array of color shapes, lacking depth. By an effort of attention the subject of the sensations is sundering the associational relations between masses of visual and tactile sensations. The result is that visual sensations do not appear as a (felt) thing. This is more difficult to do if there is motion within the visual scene and, especially, if those motions are felt as being caused by the introspecting subject.



actually supports it. The thing I see, I see *as* at a distance from myself, e.g., I see the cube as if I could reach out and grab it, I see the house as if I could walk up to it, I see the landscape as if I could walk in to it, etc. In each case, what is seen is associated with what has been sensed by touch. If these were not so correlated, I could not have an experience in which my seeing was distinguished from the thing sighted.

Support for this analysis of perceptual intentionality as a matter of complex combinations of different types of sensation comes from consideration of sense modalities that operate independently of other sense modalities. Kant claimed that seeing is the "most objective" of the senses, i.e., gives the most information about the thing, whereas tasting and smelling are the least objective and give information primarily about the state of the sensory organ (Kant 1798/1978, Book I, Sections 19 and 20, pp. 43–44). This difference in measure of objectivity (object directedness) obtains because in human beings odor and taste sensations are not systematically or consistently associated with other sensations whereas visual sensations are so associated with other types of sensations, especially with the tactile. This point can be roughly generalized: sensations lack reference to an object to the degree they lack association with other types of sensations. Or, to put it positively, sensations have intentionality proportionate to their association with sensations of different types. Hence, though color sensations are peculiar to vision, such sensations are caused by features of things (i.e., patterns on surfaces spread out in space) that also often cause patterns of tactile sensations. Because of such associations, sensations of color do possess a measure of directedness. The generalization jibes with the traditional employment in epistemology of the distinction between primary and secondary qualities (e.g., by Galileo and by Berkeley in his character "Hylas"). The common Renaissance epistemological stance was that only the primary qualities of experience or common sensibles (motion, shape, size, etc.) were "real" properties of extra-mental things. The secondary qualities of experience or special sensibles (color, tone, warmth, etc.) were merely "subjective" features of our experience, though caused by the real properties of things. This is correct in the sense that the special sensibles/secondary qualities come to be intentional or possess objective reference only if associated into complexes with common sensibles/primary qualities (A.D. Smith, 1990). However, the generalization is only rough since tactile sensations, for example, can acquire a measure of object directedness simply by being appropriately associated with other tactile sensations. Furthermore, the simple fact that some feature of a thing stimulates more than one type of sensory mode does not by itself make the resultant sensations refer beyond themselves. Though surfaces spread in space stimulate both the tactile and visual sense organs of human beings, the mere stimulation of both does not constitute directedness upon a thing for either type

of sensation. What is critical for intentionality is that the sensations be associated in the manner described in the previous section.

### The Intentionality of Other Types of Mental Activity

This causal account of intentionality applies most evidently in cases of veridical perception in which the intentional relation obtains between a state of mind (or brain) and some physical thing in the environment which is acting on that mind via sense organs. However, any mental act will be about something if it results in a state that has the same internal (and external) relational characteristics as those that obtain among the sensations constituting perceptual intentionality. Specifically, a state that results from mental activity will be about some thing distinct from the state if (1) the state's internal structure is formally isomorphic with that thing, (2) the state is efficiently caused by that thing, and (3) the state's internal structure is formally correspondent to that very causal relationship between the thing and that mental activity. This final condition requires that the state be internally formed in way that models the distinction between extra-mental entity and mental activity, the concomitant variance between these and the dependency of one upon the other.

This "causal-informational correspondence" account of intentionality is applicable to both passive and active operations of the mind. The former involve the stimulation of a mental capacity (a passive power to be affected) as in perceiving. The latter involve the activation of a mental ability (an active power to effectuate), as in choosing. In either of these basic types of intentional mental operation, direction of fit is brought about by the association of the operation with other operations in a manner that corresponds to the causal relation between the thing and the operations that are caused by the thing (as in undergoings or passions) or that corresponds to the operations and the thing caused by those operations (as in actions, mental or physical). Different schools of thought concerning the fundamental nature of the mind emphasize differently its active or passive character: empiricists tend to emphasize the passive, receptive character of the mind whereas rationalists tend to emphasize the active, constituting character of the mental. Furthermore, these different emphases enter into various combinations with fundamental epistemologies and ontologies of mind.

Epistemological theories range between two extremes. At one end is classical realism which is the view that, most of the time, humans are aware of a reality that exists independently of their consciousness of it. At the other extreme is subjectivist anti-realism, which is the view that the content of reality is exhausted by what appears in/to human consciousness. Within realist epistemologies then, a passive mental state intends a thing which is other

than it if (1) the state corresponds to the thing, (2) the mental activity which brings about the state is caused by the thing, and (3) the state's internal structure parallels the causal relation from thing to state. An active mental state intends an extra-mental thing (e.g., an artifact to be made or a behavior to be displayed) if (1) the state corresponds to the thing, (2) the mental act which produces the state thereby causes that thing, and (3) the state's internal structure parallels that causal relation from state to thing.

According to extreme anti-realist epistemologies, there is no thing that exists independently of the mental state that causes it or is caused by it, with which it is isomorphic, etc. Therefore, within these epistemologies a state is intentional only in the sense that its internal structure parallels the relation between itself and the activity that produces it. Anti-realism is simply the denial that intentional states are related to an extra-mental realm of things or to any relations between such states and extra-mental things.

Ontological conceptions of mind also vary between extremes. At one extreme is the theory of absolute idealism — all that exists, is ideational or mental in nature. At the other extreme is materialism — all that exists, is material or physical in nature. According to idealist ontologies, our minds are noetic beings and are acted upon and/or act on entities that enjoy noetic being. Within idealistic *realism* the things with which our minds interact are extra-mental noetic entities, whereas within idealistic anti-realism mental objects only interact with other mental objects. In either version of idealism, if a mental act is *about* some such abstract entity then the act is caused by the entity or causes it, the act is structured in a manner that is correspondent to the entity and the structure of the act is correspondent to that very causal relation. Materialist ontologies countenance only physical things. Accordingly, our minds are conceived as physical entities (systems of nerve cells) that only interact with physical things. In materialistic realism such things are extra-cranial material entities and in materialistic anti-realism they are always only material intra-cranial states (Jerry Fodor?). In either version of materialism, a physical act is about a physical thing (a mental act is intentional) only if the act formally corresponds with the thing, causes it/is caused by it, and formally corresponds to the causal relation itself between the act and the thing.

The "causal-informational correspondence" account of intentionality is neutral with respect to these epistemological and ontological conceptions. If acts of mind can be directed upon entities with unusual ontological status then that entails that our minds are causally related with unusual realms. If mental acts do not relate to things existing outside of the mind then the intentionality of a mental act is only the relation between the act and the state that it brings about. Thus, extrapolation of this basic account of intentionality to mental activities other than perception does not entail specific metaphysical or epistemological commitments.

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