

- Clark H H, Brennan S E 1991 Grounding in communication. In: Resnick L B, Levine J M, Teasley S D (eds.) *Perspectives on Socially Shared Cognition*. APA, Washington, DC, pp. 127–49
- Clark H H, Schreuder R, Buttrick S 1983 Common ground and the understanding of demonstrative reference. *Journal of Verbal Language and Verbal Behavior* **22**: 245–58
- Deacon T W 1997 *The Symbolic Species: The Co-evolution of Language and the Brain*. W.W. Norton, New York
- Fussell S R, Krauss R M 1991 Accuracy and bias in estimates of others' knowledge. *European Journal of Social Psychology* **21**: 445–54
- Goody J 1977 *The Domestication of the Savage Mind*. Cambridge University Press, Cambridge, UK
- Hauser M D 1996 *The Evolution of Communication*. The MIT Press, Cambridge, MA
- Keysar B, Barr D J, Horton W S 1998 The egocentric basis of language use: Insights from a processing approach. *Current Directions in Psychological Science* **7**: 46–50
- Krauss R M, Glucksberg S 1977 Social and nonsocial speech. *Scientific American* **236**: 100–105
- Krauss R M, Fussell S R 1996 Social psychological models of interpersonal communication. In: Higgins E T, Kruglanski A W (eds.) *Social Psychology: A Handbook of Basic Principles*. Guilford Press, New York, pp. 655–701
- Levelt W J M 1989 *Speaking: From Intention to Articulation*. MIT Press, Cambridge, MA
- Levinson S C 1983 *Pragmatics*. Cambridge University Press, Cambridge, UK
- Piaget J 1952 *The Language and Thought of the Child*. Humanities Press, New York
- Schober M F 1993 Spatial perspective-taking in conversation. *Cognition* **47**: 1–24
- Seyfarth R M, Cheney D L, Marler P 1980 Vervet monkey alarm calls: Semantic communication in a free-ranging primate. *Animal Behavior* **28**: 1070–94
- Sperber D, Wilson D 1986 *Relevance: Communication and Cognition*. Harvard University Press, Cambridge, MA
- Tinbergen N 1952 Derived activities: their causation, biological significance, origin and emancipation during evolution. *Quarterly Review of Biology* **27**: 1–32
- von Frisch K 1967 *The Dance Language and Orientation of Bees*. Belknap Press of Harvard University Press, Cambridge, MA

R. M. Krauss

Verstehen and Erklären, Philosophy of

Verstehen (interpretative understanding) and *erklären* (law-governed explanation) are two ways to make scientifically respectable sense of a phenomenon. The scientist who engages in *erklären* tries to make explanatory sense of the phenomenon by finding the laws that govern it, whereas the scientist who engages in *verstehen* tries to make empathetic sense of the phenomenon by looking for the perspective from

which the phenomenon appears to be meaningful and appropriate.

The originally German tradition of *verstehen* insists that the social sciences are unlike the natural sciences in that making merely *explanatory* sense of social phenomena can never lead to comprehensive knowledge of these phenomena, even if explanation would be enough, and indeed is all there is to comprehensive knowledge of natural phenomena. The reasons for this claim will be reviewed in this article. A first set of reasons, discussed in Sect. 1, derives from an investigation of the differences between natural and social phenomena. A second set, discussed in Sect. 2, derives from a survey of a number of controversies that are high on the agenda of those who assume that *verstehen* and *erklären* are incompatible methods, only one of which can be the proper method of the social sciences.

1. The Autonomy of the Geisteswissenschaften

The German verb *verstehen* is, from a philosopher's point of view, closely connected with Dilthey (1833–1911) and his concern to secure the autonomy of the *Geisteswissenschaften*. A salient feature of the development of German intellectual culture in the nineteenth century was a growing awareness of the fact that philosophy and metaphysics are themselves historical phenomena. An important consequence of this insight was that thoughts and ideas and such like came to be seen as part of the furniture of the world. Thoughts and ideas are not outside the world in some timeless conceptual realm; they are objects in the world that could, in principle, be studied by empirical science. Of course they are peculiar objects, these mental appearances ('*geistige Erscheinungen*'); they are objects with content, quite unlike natural phenomena, but are nonetheless empirical objects. An excellent example is a text printed in a book. That is obviously an empirical object—ink on paper—but is very unlike the ink spilled on blotting paper. Crucial to the text is that it means something, and this feature of the text is so important to its identity that we can easily make sense of the claim that a text which physically consists of nothing but ink on paper can still be numerically identical to a text which physically consists of sounds produced by a human voice, or even (as we now know) to a text which physically consists of a long series of bits on a computer disk.

The fact that the meaning of mental appearances such as texts is so fundamentally important to their identity motivated Dilthey to defend the view that there are two radically different kinds of empirical objects: natural and mental phenomena. According to Dilthey, this dualism within the empirical realm asks for and justifies a dualism on the level of scientific methods. Natural science already proved to be successful in making explanatory sense of natural phenomena by means of *erklären*. But the *Geistes-*

wissenschaften could not and should not try to make sense in a similar way (by *erklären*) of mental phenomena such as thoughts and ideas, even though it finally becomes commonsensical—or so Dilthey believed—that mental phenomena, like natural phenomena, are part of the furniture of the empirical world. If the *Geisteswissenschaften* were to be successful, Dilthey argued, they should not look for explanations in terms of covering laws, but should concentrate on the attempt to make empathetic sense of mental phenomena by means of *verstehen*. After all, the only way to acquire scientifically respectable knowledge of a phenomenon is to gain comprehensive insight into what is of crucial importance to the essence of the phenomenon; in the case of the mental phenomena, this means grasping their meaning.

In order to appreciate the relevance of this reasoning to the social sciences, it is important to point out how likely it is that one will take a second step after having pointed out the relevance of a distinction between mental and natural phenomena. This second step consists in claiming that what is crucial to social phenomena such as human actions is that they mean something, which makes them much more similar to mental appearances such as texts than to natural phenomena such as leaf-fall in autumn. It is relevant in this context to note that the twentieth-century French philosopher Ricoeur (1981, pp. 197–221) has argued that it is almost literally true that human actions are texts.

According to philosophers who defend the autonomy of the *Geisteswissenschaften* (e.g., Dilthey), the paradigmatic objects to be investigated by means of *verstehen* are the social and cultural manifestations of human life, characterized not only by being (a) meaningful, but also by being (b) purposive and (c) essentially relational. As will be shown in the remainder of this section, some of the details of the method of *verstehen* can be brought to the fore by discussing these three aspects of the manifestations of human life.

However, in this connection it should be stressed that although the distinction between *erklären* and *verstehen* was originally made in close connection with that between natural and mental phenomena as well as that between natural science and the *Geisteswissenschaften*, there is no need to accept these three distinctions as one package. That is, one can defend the view that there is a real and important distinction to be made between *erklären* and *verstehen*, independent of whether or not it is (a) plausible to defend that a neat split can be made between natural and mental phenomena, and (b) useful to divide the academic disciplines into the natural sciences and the *Geisteswissenschaften*. In the remainder of this article, it will be taken for granted that the social and behavioral sciences have no interest in making or accepting the latter two distinctions, although it is important for them to accept and take notice of the

methodological distinction between *erklären* and *verstehen*.

1.1 Meaningfulness

Things have meaning (at least to a very large extent) in virtue of the fact that people ascribe meaning to them. These ascriptions can be diverse and numerous and can display a multitude of perspectives, motives, and biases. This has two consequences for the scientist engaged in *verstehen*. The first is that it is pretty absurd—if not impossible—to try to capture a phenomenon's meaning independent and irrespective of the meaning ascribed to it by all those people in whose life this phenomenon has a role to play. The meaning of, for example, a gesture such as a smile cannot be found if you start by excluding the meaning ascriptions of all the people involved. This should not, of course, mislead the scientist into thinking that a particular meaning ascription is as good as any other. Nor should he simply assume that particular persons (e.g., the author of a text) have a principled authority over the meanings to be ascribed. *Verstehen* is a delicate undertaking that requires careful attention. A scientist engaged in *verstehen* faces the important challenge of deciding on the relevance and import of each and every meaning ascription (see Schutz 1970).

The second consequence of the prominence of meaning ascriptions is that a double hermeneutics necessarily forms part and parcel of *verstehen*. Trying to grasp the meaning of a phenomenon is always a matter of trying to grasp the meaning of a pre-interpreted phenomenon. And it is one thing to grasp the meaning ascribed to the phenomenon by an earlier act of interpretation, but quite another to grasp the meaning this earlier act of interpretation attempted to grasp. This can lead to a conception of *verstehen* as a quest for the original meaning of a phenomenon, a conception that was dominant in the hermeneutic tradition of Dilthey. The German philosopher Gadamer (1960), however, argued that such a quest beyond all prejudices would be futile. A prejudice is an original meaning ascription, and—rather than blocking the road to empathetic understanding—these prejudices open up the very possibility of *verstehen*. There are no original meanings, according to Gadamer. There are only original meaning ascriptions. The intentions of the person who, for example, makes a gesture, share this character of being a prejudice (i.e., a meaning ascription) with the social scientist's attempt to make empathetic sense of this gesture. Meaning exists, in Gadamer's view, in the multifaceted meeting of different meaning ascriptions to the same phenomena. This leads to a conception of *verstehen* in which the growth of self-understanding is always as central to the scientific enterprise as is the growth in interpretative understanding of the phenomenon investigated.

1.2 Purposiveness

According to many, teleology—or purposiveness—is a distinctive feature of human action. Human actions take place *in order to* bring certain future states of affairs about, not merely *because* certain past states of affairs happened. I go to the hairdresser *in order to* have my hair cut, not merely *because* my hair has grown. This emphasis on goal-directedness and final causes in the description of human action is foreign to the spirit of modern science, which seems so successfully engaged in redescribing purposiveness in terms of functionality and functionality in terms of organizational structures that arise through natural selection. Human action seems to be a last vestige of teleology, and the adherents of the *verstehen* tradition took pains to defend it by arguing for a radical distinction between human behavior and all other natural events. *Erklären*, they argue, is a matter of making explanatory sense of natural events by citing their cause, but there is more to be done than just that in making sense of human actions. Part of what is needed in making sense of actions is to rationalize them, that is, to make empathetic sense of them by citing their reason. And reasons are essentially normative: if I were to try to explain my visit to the hairdresser by merely citing the fact that my hair has grown, I would fail to explain my action, unless I explicitly mention the implicit normativity, that is, that my hair has grown *too long*. The normativity that figures conspicuously in the rationalizing of actions is the tough nut to crack for those who wish to remove purposiveness from any description of such mental phenomena as human actions.

A lot of extremely interesting work done on the relation between explaining by citing causes and explaining by citing reasons can be found in the Anglo-American literature (Davidson 1980, Taylor 1964, Malcolm 1968, Wright 1971, Dennett 1973, Macdonald and Pettit 1981). This work, although mainly written without engaging with the tradition of *verstehen*, is very helpful in that it elucidates what it means to make empathetic sense of an action by looking for the reasons that make the action meaningful and appropriate.

1.3 Essential Relationality (Holism)

According to adherents of the *verstehen* tradition, we pick out natural and mental phenomena in very different ways. We can pick out, or individuate, natural phenomena without engaging in an attempt to make explanatory sense of them. That is precisely what creates the demand for natural science: here is a natural event (say the collapse of a bridge) and we can identify it in such a way that we know we are talking about this event, even though we have not the faintest idea of what caused it to happen. Thus, we can fail to understand a phenomenon we can describe quite

accurately, and this is what motivates us to engage in *erklären*, that is, to look for causal and law-governed explanations.

We cannot, however, pick out mental phenomena in a similar way. Because their meaning is crucial to their identity, it is impossible to individuate a mental phenomenon without, by the same token, engaging quite seriously in an attempt to make empathetic sense of it. That is, the atomism that seems possible with respect to natural phenomena (each of which can be described in total isolation from the others) is completely foreign to the realm of mental phenomena. Getting acquainted with these phenomena requires holistic assumptions. In order to pick out such a mental phenomenon as a vote, for example, we need a tremendous amount of detailed knowledge about a whole background in which events could count as votes. This entails knowledge of institutions, of means to justify authority, of decision procedures, etc. This semantic background contains more than just the conceptual relations that make it possible for something to be a vote. It also contains the intentional relations that make it true that some bodily behavior constitutes a particular vote; the intentional relations that determine, for example, that this arm being raised at this particular moment counts as a vote for X, a vote that could also have been expressed by this particular option box being ticked, or by this name written down on this particular slip of paper, etc.

The holism that is essential to the individuation of mental phenomena has important consequences for the method called *verstehen*. Whereas it might be true that a law-governed explanation of a particular natural phenomenon urges us to completely revise our ordinary description of the phenomenon (e.g., contrary to what we always thought, we now know that solid bodies consist mainly of the void), it is inconceivable, according to adherents of the tradition of *verstehen*, that a scientifically respectable, interpretative understanding of the manifestations of human life could radically replace our ordinary understanding of them. The *Geisteswissenschaften*, it is claimed, are bound to elaborate on the conceptual scheme of common-sense (nowadays often labelled folk psychology), because they can only begin to make empathetic sense of mental phenomena such as human actions in virtue of accepting the commonsensically sound understanding of these actions implied by our means to pick them out in the first place.

This is known as the hermeneutic circle, or the inescapability of each individual's own traditional semantic horizon. It raises many of the most important questions discussed in the *verstehen* tradition, for example, how to understand the manifestations of a foreign culture, or texts written in bygone times.

The upshot of the discussion so far is that there is a useful distinction to be made between a scientific interest in the causal laws that govern phenomena and a scientific interest in the perspective from which

phenomena appear to be meaningful and appropriate. The former interest can be satisfied by engaging in *erklären*, the latter by engaging in *verstehen*. *Verstehen* involves (a) the careful assessment of the relevance of meaning ascriptions, (b) a double hermeneutics, (c) a concern for self-understanding, (d) a rationalization of phenomena by citing reasons, (e) a disclosure of implicit normativity, (f) an acceptance of semantic holism, (g) of the inseparability of description and interpretative understanding, and (h) of the inescapability of semantic horizons.

Whether or not these features disqualify *verstehen* as a scientific method, or force us radically to revise our conception of (social) science, has been the topic of serious controversies.

2. *Two Ways to Do Social Science? Some Controversies*

The German verbs *verstehen* and *erklären* almost immediately suggest the image of an opposition and, therefore, of a controversy. Although there were periods in nineteenth- and twentieth-century German intellectual life during which *verstehen* and *erklären* were conceived to coexist peacefully—the first being at home in the humanities, the second in the natural sciences—the most disturbing, and fruitful, interest in the concepts arose during two periods (the first and second *Methodenstreit*) in which people fought over which of the two methods would be most appropriate to the social sciences. During the first period (roughly 1900–30), neo-Kantians such as Rickert, Cassirer, and, most influentially, Weber tried to come to terms with the methodological dualism that seemed characteristic of the social sciences that emancipated at the time from philosophy. During the second period (roughly 1955–85), Wittgensteinians, phenomenologists, and critical social theorists mainly discussed the impact of the ontological commitments connected with a *verstehen* approach to social reality on our conception of (social) science.

In this section, four themes that were high on the agenda during those periods will be discussed. The discussion will be conceptual; no attempt will be made to provide a picture of the historical development of these themes (see *Hermeneutics, History of*).

2.1 *Unity of Science*

Positivism (see *Comte, Auguste (1798–1857); Logical Positivism and Logical Empiricism*) followed in the wake of the natural sciences, endorsing the view that science is to be defined by the methodological procedures that enable us to explain and predict natural phenomena so successfully. If there are to be social sciences, the demand of the unity of science will imply that the method used in natural science (*erklären*) must also be applicable to human action. If

human action allows for scientific knowledge this will mean, according to the positivist credo, that we can and should try to explain human actions by looking for the causal laws that govern them.

This bold statement evoked worries, misunderstandings, and refinements with respect to the place of *verstehen* in the social sciences. One plausible reaction (developed by neo-Kantians during the first *Methodenstreit*) is to defend the unity of science but deny the defining role of *erklären*. Science, one could say, is an attempt to make systematic and generally accessible sense of all phenomena. But there is more systematic and generally accessible sense to be made of what happens than merely explanatory sense. We can—and in the case of the manifestations of human life, should try to—make empathetic sense of what takes place by looking for the perspective from which these manifestations appear to be meaningful and appropriate.

Part of the positivistic project, however, was to show that there is no need and no place for empathetic sense in science. If the meaning and the appropriateness of human actions are to be accounted for by science in a systematic and generally accessible framework, this should be done, according to the positivists, by investigating objective patterns of behavior and not by telling stories about how these patterns look from the necessarily perspectivistic point of view of the people on the scene. The main problems with this line of reasoning are discussed under the three following subsections.

2.2 *Intentional Explanations*

According to the positivists, actions are to be explained by subsuming them under general, contingent, empirical, causal laws that connect mental states of individual agents (in particular, their beliefs and desires) to their actions, that is, their overt bodily movements. Acknowledging that reasons are in fact sets of beliefs and desires that function as causes is—according to the positivists (see *Hempel, Carl Gustav (1905–97)*)—the starting point for a social science that can make progress by engaging in *erklären*.

Opponents of this view argue, along three different lines, that one can make empathetic sense of human actions by producing intentional explanations (i.e., explanations citing beliefs and desires), but that such explanations are not a matter of *erklären*, because intentional explanations are neither causal nor nomothetic (involving laws).

First, a Wittgensteinian line of argument says that pointing out the relevance of the agent's beliefs and desires in order to explain the apparent appropriateness of an action is not a matter of citing its cause or of hinting at an underlying causal mechanism. Intentional explanations do nothing more than provide us with useful redescriptions of actions that surprise us (Taylor 1964, Winch 1958, Wright 1971).

Second, the Logical Connection argument says that intentional explanations cannot be causal, because the relation between the mental states of the agent and the action they are supposed to have caused is not contingent but logical. To correctly describe an action as, for example, a vote, logically requires ascribing to the agent the intention to vote. Entities that cannot really be distinct (e.g., actions and their accompanying intentions) cannot be related causally. This conclusion does not deprive intentional explanations of their role in science. Their import is not one of *erklären*, but of uncovering normative relations holding between the agents and institutions involved in the genesis of the phenomenon to be made sense of (Stoutland 1970).

A last line of argument concentrates on the nomothetic (or law-involving) character of *erklären*, arguing that things are different when explaining action: the principles of behavioral and attitudinal rationality that we use in intentional explanations do not function as contingent laws but as a priori principles. That is, *erklären* requires that we take pains to fill in the contingent, endlessly revisable details of the causal laws that govern the phenomena we investigate. *Verstehen*, however, requires us to take pains to redescribe occurring human phenomena over and over again until they make empathetic sense, and we can do this only if we accept the following principles as a priori true: agents tend to (a) act in accordance with what they believe and desire, and (b) believe what they have reason to believe to be true, and desire what they have reason to value (Davidson 1980, 1984, Macdonald and Pettit 1981).

2.3 Subjective Meanings

Many argue that one of the most important features of science is that it is a systematic attempt to transcend distorting effects of particular, biased, subjective points of view. That is, science aims at objectification, and this leaves absolutely no room for a necessarily perspectivist *verstehen* approach.

The best reply to this line of thought from adherents of the *verstehen* tradition is to point out a problem science should have with subjective meanings, a problem one fails to recognize (let alone address) if one takes an *erklären* approach to human action. The problem was mentioned above in discussing the hermeneutic circle (Sect. 1.3). Subjective meanings are part and parcel of intentional phenomena. Part of what such phenomena are is what they are taken to be from the commonsensical point of view by those engaged in them. Understanding such phenomena requires us to investigate subjective meaning ascriptions (Sect. 1.1), being both a first step towards interpretative understanding (*verstehen*) and an essential building block of the manifestations of human life. The problem can be described as a paradox: is it possible to acquire scientific knowledge of subjective meanings

if such knowledge requires transcendence of subjective points of view?

The point can also be stated in another way: to identify a phenomenon as an action implies reference to the contentful mental states (beliefs and desires) of the agent. These states must, according to the principles of behavioral and attitudinal rationality, be roughly in tune with the action and with what the agent believes to be true and desirable. We cannot change the last part of the previous sentence into 'with what *is* true and desirable,' as though this would be something radically independent of the agent's interpretation of it. That is, we cannot sidestep the attempts of agents to ascribe meaning to their actions. In speaking of actions we have to take seriously the commonsensical and folk-psychological interpretations of those involved in the actions. This does not, however, commit us to accept that the agent's interpretation of the action has a privileged authoritativeness. But neither has ours. It is in the careful and sensitive confrontation between the various ways of ascribing meanings that two things happen: (a) the manifestations of human life take shape, and (b) interpretative understanding (*verstehen*) becomes possible.

2.4 Deliberation

Rational choice theory (see *Rational Choice Theory: Cultural Concerns*) is the most serious attempt to fully acknowledge the normativity that is crucial to intentional explanation, and the subjective meanings that play their indispensable role in behavioral and attitudinal rationality, without giving up the aim of a unified science based on *erklären*. The hope of rational choice theory is to explain and predict human action in terms of laws that causally relate expected utility numbers and ensuing actions. The idea is that for an agent whose preferences conform to various constraints, it is possible to represent him as having a utility function and a probability function such that every action maximizes expected utility as computed by those functions (Eells 1982).

A strong reply is open to those favoring a *verstehen* approach. It starts from the observation that a choice is not merely an event that occurs, but is always also a decision made by an agent capable of deliberation. Consider a case where a couple wanders down the street, looking for a place to eat, and deciding to opt for that small Thai restaurant next to the popular pizzeria. It is quite likely that explanatory sense can be made of this choice in terms of the calculation of utility numbers and some additional game theoretic considerations about successful co-operation. But such a story is of no use in trying to make sense of their conversation as a matter of deliberation (Pettit 1991). If we want to make sense of the way in which the woman replies to a suggestion made by the man, and

vice versa, and of how this conversation is their way of making up their minds about where to eat, then we need something rational choice theory does not give us: interpretative understanding. That is, rational choice theory could perhaps make explanatory sense of events that we would ordinarily describe as choices, but making sense of them as choices, as decisions reached by agents who reason their way to these choices, is something that requires a *verstehen* approach. Making a choice or forming an intention is done by deliberative agents, capable of recognizing and responding to considerations of evidence ('Look! They serve Teriyaki!') and valuation ('Oh, you know, you always hate those crowded places.').

Agents capable of deliberation should be in episodic contact with the normative import of the contents of their beliefs and desires. Deliberation requires an intelligibility related to the first-person perspective of a rule-follower. Deliberative agents must be able to exercise their care for the rationality of their beliefs—given what they have reason to believe to be true—as well as their care for the rationality of their desires—given what they have reason to value—and they must be able to decide what to do on the basis of the beliefs and desires they come to accept as rational. Deliberation is not something that looks like explaining and predicting what to do given the expected utility numbers one assigns to possible outcomes. In deliberation, one does not predict one's own actions. Of course, deliberation might involve the weighting of utility numbers, but if it does, it does not do so from the explaining and predictive standpoint of rational choice theory, but from the first-person standpoint of appreciating the normative import of these numbers as reasons on the basis of which one will choose to do what one does. This is so, even in those cases where habits seem to rule ('Yes, we always end up in this restaurant—but of course, we cannot discuss such predictions as predictions.').

If we are to think of choices and actions as events brought about by deliberating agents who care to be rational (i.e., who try to determine and follow the appropriate rules) and who ascribe meaning to what they do, we cannot do without *verstehen*. Although this does not rule out rational choice theory altogether, it does rule out the possibility of a completed social science based on merely an *erklären* approach.

Bibliography

- Apel K O 1955 Das Verstehen. Ein Problemgeschichte als Begriffsgeschichte. *Archiv für Begriffsgeschichte* 1: 142–99
- Dallmayr F R, McCarthy T A 1977 *Understanding and Social Inquiry*. University of Notre Dame Press, Notre Dame, IN
- Davidson D 1980 *Essays on Actions and Events*. Clarendon Press, Oxford, UK
- Davidson D 1984 *Inquiries into Truth and Interpretation*. Clarendon Press, Oxford, UK

16170

Copyright © 2001 Elsevier Science Ltd. All rights reserved.
International Encyclopedia of the Social & Behavioral Sciences

- Dennett D 1973 Mechanism and responsibility. In: Honderich T (ed.) *Essays on Freedom of Action*. Routledge and Kegan Paul, London
- Eells E 1982 *Rational Decision and Causality*. Cambridge University Press, Cambridge, UK
- Gadamer H-G 1960 *Wahrheit und Methode: Grundzüge einer philosophischen Hermeneutik*. Mohr, Tübingen, Germany
- Habermas J 1967 *Zur Logik der Sozialwissenschaften*. Mohr, Tübingen, Germany (1988 *On the Logic of the Social Sciences*. MIT, Cambridge, MA)
- Henderson D K 1993 *Interpretation and Explanation in the Human Sciences*. State University of New York Press, Albany, NY
- Hollis M 1994 *The Philosophy of Social Science*. Cambridge University Press, Cambridge, UK
- Macdonald G, Pettit P 1981 *Semantics and Social Science*. Routledge and Kegan Paul, London
- Malcolm N 1968 The conceivability of mechanism. *The Philosophical Review* 77: 45–72
- O'Hear A (ed.) 1996 *Verstehen and Humane Understanding*. Royal Institute of Philosophy Supplement 41. Cambridge University Press, Cambridge, UK
- Outhwaite W 1975 *Understanding Social Life*. Allen and Unwin, London
- Pettit P 1991 Decision theory and folk psychology. In: Bacharach M, Hurley S (eds.) *Essays in the Foundations of Decision Theory*. Blackwell, Oxford, UK
- Ricoeur P 1981 *Hermeneutics and the Human Sciences*. Cambridge University Press, Cambridge, UK
- Riedel M 1978 *Verstehen oder Erklären? Zur Theorie und Geschichte der hermeneutischen Wissenschaften*. Klett-Cotta, Stuttgart, Germany
- Schutz A 1932 *Der Sinnhafte Aufbau der Sozialen Welt, eine Einleitung in die verstehende Soziologie*. Springer, Vienna (1967 *The Phenomenology of the Social World*. Heinemann, London)
- Schutz A 1970 *Reflections on the Problem of Relevance*. Yale University Press, New Haven, CT
- Stoutland F 1970 The logical connection argument. *American Philosophical Quarterly* 7: 117–30
- Taylor C 1964 *The Explanation of Behaviour*. Routledge and Kegan Paul, London
- Taylor C 1985 *Philosophy and the Human Sciences*. Cambridge University Press, Cambridge, UK
- Weber M 1922 *Gesammelte Aufsätze zur Wissenschaftslehre*. Mohr, Tübingen, Germany
- Weber M 1949 *Max Weber on the Methodology of the Social Sciences*. Free Press, Glencoe, IL
- Winch P 1958 *The Idea of a Social Science and its Relation to Philosophy*. Routledge and Kegan Paul, London
- Wright G H von 1971 *Explanation and Understanding*. Routledge and Kegan Paul, London

J. Bransen

Vestibular System

1. Introduction

Throughout the evolution of life on the planet Earth the phenomena of light and gravity have played a compelling role in the development of many biological

ISBN: 0-08-043076-7