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A perspectivist approach is taken to the theory-construction process in psychological research. This approach assumes that all hypotheses and theories are true, as all are false, depending on the perspective from which they are viewed, and that the purpose of research is to discover which are the crucial perspectives. Perspectivism assumes also that both the a priori conceptual phase of research and the a posteriori empirical phase have both discovery and testing functions. Topics discussed include how the perspectivist approach can improve methodology training and practice (particularly as regards theory construction); what researchers accept as theoretical explanations; the nature of mediational theories; how theories can be formalized, expressed in multiple modalities and for various scaling cases; and how experimental designs can be enriched by theory-guided mediational and interactional variables.

Psychologists have co-opted as their just demesne a fascinating range of topics for study, but the yield of their studies often falls disappointingly short of their promise, evoking worry that psychologists possess a Sadim (reverse Midas) touch such that every hypothesis we touch turns to dross. Part of the problem is that we fail to create explanatory theories that are as interesting as the topics they are supposed to explain. Here I propose improvements in our methods and substance courses that would empower psychologists to construct nonobvious, even counterintuitive, theories that are as fascinating as the topics that earlier enticed us into psychology.

Scope of a Perspectivist Approach to Theory Construction in Psychology

A perspectivist reconceptualization of methodology (McGuire, 1989, 1999) is proposed here better to realize the creative potential of one's theorizing. Beginning with definitions of basic concepts such as variables, hypotheses, and theories, I describe creative theorizing processes, especially mediational theories, as regards their ubiquity, logical structure, subtypes, and alternatives. I discuss theory desiderata that are often ignored and even deplored, such as the usefulness of formalizing theories and of expressing them in multiple modalities and for diverse cases as regards scaling of their variables. Finally, I discuss how a perspectivist approach can guide our theory construction to add interesting mediational and interactional variables to one's experimental design before one begins the labor-intensive empirical investigation of one's hypotheses and their theoretical explanation.

The perspectivist approach re-establishes as a researcher's main responsibility and opportunity the creation rather than the testing of theory. I describe how one's research can be done not only better but more joyously, theory creation being the ultimate pleasure in a life in science. As Gerard Manley Hopkins (1918/1998) in his sonnet "To R. B." explains to Robert Bridges that what sustained him in his often grim creation was the roll, the rise, the carol, the creation that warmed his winter world. We need this, he wrote, the one rapture of an inspiration, the fine delight that fathers thought … and leaves yet the mind a mother of immortal song.

> The widow of an insight lost she lives, with aim
> Now known and hand at work now never wrong.
> (Hopkins, 1918/1998)

Miss this glorious undertext and one misses my message. By exploiting perspectivism, one can make research a class act.

Some Basic Concepts: Variables, Hypotheses, and Theories

A major purpose of psychological research is to generate and evaluate knowledge representations, usually formalized verbally as propositions (hypotheses, predictions) that state relations between variables of interest. Psychological variables are aspects (in-

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cluding thoughts, feelings, and actions) on which people differ from one another. Our usual simple main-effect monotonic hypotheses assert a positive or negative (direct or inverse) relation between an independent variable, IV, from which we are predicting and a dependent variable, DV, to which we are predicting, DV = *f* (IV). Variables are related to the extent that knowing where people are located on the IV allows us to improve, by more than a chance amount, the accuracy of our predictions of where these people are located on the DV. Other types of variables beside IV and DV to be considered later are mediating variables (MV), interactional variables ($_i$IV), control variables (CV), exploratory variables (EV), and serendipitous variables (SV).

Variables of each type, which together make up the molecules of one's knowledge, can usefully be given a conceptual definition and an operational definition. For example, if one is studying aggressiveness, one might begin developing a conceptual definition as "a tendency deliberately to hurt another person," and one might begin an operational definition in terms of some specific set of observable operations of a person (the participant) in a designated situation (e.g., how many times an angered preschooler kicks an inflated Bobo doll). Conceptual definitions tend to be more useful for generating knowledge (hypotheses, theory) and operational definitions tend to be more useful for evaluating this knowledge.

A main-effect hypothesis is a proposition that states a predicted relation between variables, usually having as its logical structure IV -$^{+/-}$-> DV. A hypothesis uses knowledge (a) of where a sample of people fall on the IV and (b) of a theorized relation between IV and DV to predict (c) where these people fall on the DV. A theory is a proposition or a set of propositions that explain (account for) such a hypothesized relation. Definitions and labels other than those previously mentioned for variable, hypothesis, and theory are tenable (and some alternatives are touched on later), but these definitions are powerful and widely held at least implicitly.

Specific characteristics on which people vary (aggressiveness, helpfulness, intelligence, exposure to the mass media, popularity, political attitudes, and so on) can fall into any of these types of variables (e.g., IV, DV, MV, $_i$IV, CV, EV, SV) by virtue of where they enter a specific argument under study. For example, aggression may be an IV in one hypothesis (argument), as when we are predicting how persons' levels of aggression will affect how liked the person will be (Agg -$^{+}$-> Lik); in another argument aggression may be a DV, as when we are predicting how exposure to televised violence will affect viewer aggressiveness (TV -$^{+}$-> Agg). The IV is often but not always the cause and the DV the effect in the hypothetical relation.

Assembling the Variables on Which One's Research Program Will Focus

Definitions and terminology like those described previously can be developed to describe rigorously and manageably how psychologists (and other scientists) can create knowledge. First, he or she selects and makes explicit to self and intended audience the basic topic of the inquiry. This is usually the DV (and sometimes the IV) point of departure for a hypothesis (i.e., for a predicted relation between variables) and for its explanatory theory. For example, if the researcher is a personality theorist or a student of human conflict, he or she might start by choosing aggressiveness as the basic variable to be studied. Second, if media oriented, the theorist might generate the hypothesis that exposure to televised violence will increase people's levels of aggressiveness (IV_t -$^{+}$-> DV_a). Third, he or she might generate a mediating theory (IV $\rightarrow$ MV_l $\rightarrow$ DV) to explain, or account for, this hypothesized relation.

Ordinarily the researcher should cast a wider net to include a broader range of variables than these three in the experimental design before proceeding to an empirical investigation. However, a researcher might decide at this point (e.g., for pedagogic purposes) to move somewhat prematurely into data collection and data analysis. If so, the researcher would measure a representative sample of *N* participants on the three variables, IV_t, DV_a, and MV_l (amount of exposure to televised violence, level of aggressive behavior, and degree to which aggression is perceived by the viewer to be legitimate), each variable measured on a multilevel scale. These $3 \times N$ data points would then be subjected to at least four analyses: (a) an IV_t -$^{+}$-> DV_a correlational analysis, $r_{t,a}$, could evaluate the initial hypothesis, that the more violence seen on TV the more aggressively the participants will behave; (b) two further analyses, $r_{t,l}$ and $r_{l,a}$, could evaluate the two premises that constituted the mediational theory, IV_t -$^{+}$-> MV_l and MV_l -$^{+}$-> DV_a; (c) a partial correlational analysis, $r_{t,a.l}$, could then be done to estimate how much of the initial-hypothesis covariance may be attributed to the theorized MV_l mediator, $r_{t,a} - r_{t,a.l}$; (d) an analysis of how much of the initial hypothesis IV_t -$^{+}$-> DV_a covariance remains even after this legitimization theoretical mediator, MV_l, is partialled out, $r_{t,a.l}$, would indicate how much the initial hypothesized relation obtains for other reasons in addition to legitimization theory.

A Popular Form of Explanation: Mediational Theories

When the researcher has formulated an IV -$^{+/-}$-> DV hypothesized relation (e.g., televised violence -$^{+}$-> viewer aggression), he or she is usually expected, be-

fore going to a test of this prediction, to generate one or more theories that could account for the hypothesis. For example, the researcher might theorize that this TV → Agg relation is accounted for (in part, at least) as due to a legitimization process. That is, the more violence persons are exposed to in television programs the more legitimate they perceive it to be to behave violently and therefore the more aggressively they themselves behave. This perceived-legitimacy-as-mediator theoretical explanation of the hypothesis can be expressed as a chain of variables, IV_t -+-> MV_l - +-> DV_a. This explanation can alternatively be formalized syllogistically as [(IV_t-+-> MV_l) & (MV_l -+-> DV_a)] → (IV_t -+-> DV_a), where IV_t is the independent variable (amount of violent television viewed), MV_l is the theorized mediating variable (how legitimate aggression is perceived to be), and DV_a is the dependent variable (how aggressively the viewer behaves). Current orthodoxy is that experiments should be guided by and designed to test (or at least investigate) not only an explicit a priori hypothesis but should be preceded by a specified a priori theoretical explanation, IV_t -+-> MV_l -+-> DV_a , from which the hypothesized relation, IV_t -+->DV_a, can be derived and accounted for. This apotheosis of theory in the psychological Establishment goes back at least to the mid-20th century when the intellectual migration of the Wienerkreis popularized logical empiricism in American psychology via H. Feigl at Minnesota, G. Bergmann at Iowa, and C.G. Hempel at Yale and Princeton.

Ubiquity of Mediational Theories

Mediational IV → MV → DV theories are not the only type of theoretical explanation, but I focus heavily on them here because I have found that in practice psychologists usually generate theories that have this mediational logical structure. This ubiquity is illustrated when I use perspectivist worksheet exercises (McGuire, 1989, 2004b) to guide research students successively from the notion of people's scores on variables, through hypothetical relations between people's scores on the variables, to theoretical explanations of the hypothesized relations. Specifically, students are asked on my worksheets to choose some interesting variable on which people differ (e.g., aggression, altruism, depression, creativity, and so on), then to generate a second variable that they conjecture to be interestingly related to the first variable (e.g., sex, mass media exposure, sibling order, anxiety, or whatever), and then to hypothesize a monotonic relation between the two variables. This yields a hypothesis in the form IV -+/–-> DV. Each student is led through this hypothesis-generating procedure reiteratively to produce a half-dozen varied hypotheses. Then the student is asked to write down several theoretical explanations that could account for each of the half-dozen hypothesized relations. Hence, the 25 or so students in each semester's research class together come up with several hundred theoretical explanations for a wide variety of self-generated hypotheses. During the past decade these methodology students of mine have together come up with several thousand explanatory theories. A logical analysis of these thousands indicates that well over three quarters of them have the logical structure of mediational theories.

The perspectivist innovation that all hypotheses, even pairs of contraries, are true (at least from some perspective) leads to further worksheet exercises that guide the student to assert the contrary proposition to his or her initial hypothesis and to generate two or more theoretical explanations of each of these contrary propositions. Again, well over three quarters of the theoretical explanations given for these contrary hypotheses also fit a mediational-theory logical structure.

For example, if the worksheet asks a student to name a psychological variable of interest, he or she might suggest "aggression" or "antisocial behavior," and when asked to name a related variable, he or she might respond with "exposure to televised violence." Asked further to hypothesize a monotonic relation between the two variables, he or she tends to say, "The more televised violence the person is exposed to (IV_t) the more (-+->) aggressively he or she behaves (DV_a)," hypothesizing a monotonic positive relation. Then, when asked to give a theoretical explanation that might account for this IV_t -+-> DV_a hypothesized relation, the student in more than three quarters of the cases gives a mediational theory as explanation, for example, "Because seeing all that violence makes the student think it is legitimate to aggress" (MV_l), or "Because seeing all that violence gets a person excited" (MV_e), or some other explanation that similarly can be spelled out to approximate the logical form of a mediational theory.

Logical Structure of Mediational Theories (and, More Broadly, What Is It "To Explain"?)

Three typical, logically equivalent expressions for a mediational theory are

1. IV_t -+-> DV_a ∵ MV_l: ≈ The more televised violence people watch (IV_t), the more (-+->) aggressively they behave (DV_a) because (∵) viewing all that violence makes one feel that it is legitimate to aggress (MV_l).
2. IV_t -+-> MV_l -+-> DV_a: ≈ The more televised violence people are exposed to, the more legitimate they perceive aggression to be, and so the more aggressively they behave.
3. [(IV_t -+-> MV_l) & (MV_l -+-> DV_a)] → (IV_t -+->DV_a): ≈ The more televised violence people watch, the more legitimate they feel it is to aggress; also, the

more legitimate they feel it is to aggress, the more aggressively they behave; therefore, the more televised violence people are exposed to, the more aggressively they behave.

These three explanations are logically equivalent. Number 3 is the full, formally correct syllogistic mediational theory, which few research students (except some trained in formal logic) spell out completely. Most students verbalize their mediational explanation in an abridged enthymemic form such as Number 1 or 2, omitting one of the premises and leaving it as understood.

That mediational theories (or at least close approximations of them) are so popular among psychology researchers as a way of explaining the world as they find it surprises me, because mediational theories have only modest explanatory power. When one explains a hypothesis (IV_t -+-> DV_a) by a mediational theory (IV_t -+-> MV_1 -+-> DV_a), little additional predictive clarification or insight is provided except that the MV_1 serves as a stepping stone, allowing one's thinking to get from IV_t to DV_a in two easy baby steps instead of one bigger step. More descriptive work is needed on the logical structure of mediational and other types of explanatory theories and on the nature of explanation in general. Explaining explanation is a timely challenge (Doise, 1997; McGuire, 2004a; Ruben, 1990, 1993).

A Variety of Mediational Theories

Mediational theories can be elaborated in several ways beyond the simple one-MV type mentioned previously, IV → MV_1 → DV. A common polysyllogistic linear elaboration lengthens the chain, IV → MV_1 → MV_2 → MV_3 → DV. The additional MVs may be added between IV and MV_1, or between MV_1 and DV, or both. We can add depth to a mediational/syllogistic explanation, alternatively, by deriving syllogistically each of the two premises of our first-order mediational theory: [(IV_t -+- > MV_0) & (MV_0 -+-> MV_1)] → (IV_t -+-> MV_1). A more dramatic perspectivist elaboration of mediational theories is to generate multiple-path mediational theories that allow additional causal paths from IV_t to DV_a. McGuire (1997) described 49 creative heuristics to aid the researcher to generate numerous mediating theories to explain a given hypothesis.

Here the hypothesis IV_t -+-> DV_a (the more television violence to which one is exposed the more aggressively one behaves) can be theorized to be due to either or both MV_1 (e.g., the viewer's cognition that it is legitimate to behave aggressively) or by MV_e (e.g., the viewer's affect, such as feeling excited). There are often direct as well as mediated paths between IV and DV (e.g., attitudes may affect behavior both directly and via a behavioral–intention mediated link).

Alternatives to Mediational Theories: Systems and Set-Inclusionist Theories

As the number of mediators increases and interrelations emerge among the mediators themselves, the theorist may advance from the unidirectional linear mediational theories so far considered to more complex systems theories (e.g., with bidirectional relations, alternative pathways, and so on, among variables), which are more complex both tactically and strategically, for example, by calling for collecting time-series data and analyzing by causal modeling.

Had the research students whom I asked to carry out my perspectivist worksheet exercises lived in the classical or medieval eras rather than in the modern era (i.e. in the Aristotelian rather than the Galilean era, to use Kurt Lewin's terms), most of the students might have generated set-inclusionist theories rather than the mediational theories generated by my 20th and 21st centuries students. That is, asked to explain the death of Socrates, they might theorize, "Because he is human" or, more fully and explicitly, "All humans are mortal; and Socrates belongs to the class of humans; therefore Socrates is mortal." Such set-inclusionist theories are even more limited than mediational theories, but they continue to be popular in philosophical and other nonempirical disciplines that still send their students out hunting for black swans.

On Advantages of Formalizing One's Theories

Current research students usually offer mediational theories to explain a hypothesis but express this theory in an informal manner, often leaving one theoretical premise implicit so the argument is given as an enthymeme rather than a complete syllogism. My worksheets encourage students to go beyond such abridged statements of mediational theories by stating their explanatory argument in full and explicit syllogistic form. This may seem pedantic, because it is commonly assumed that the essence of scientific or mathematical creativity lies in one's initial cryptic and informal "eureka!" discovery of the gist of the insight and that the subsequent working out of the formal proof is just an uncreative tidying up for publication of the initial vague insight. However, I find that in empirical theorizing the transformation of the initial gist of the mediational theory into a full formal syllogistic argument facilitates the theorist's exploiting the creative potential of the explanation. This can be illustrated by putting the MV_1 explanation into valid syllogistic form:

> Minor premise. The more televised violence that people view (IV_t), the more legitimate they perceive it to be to behave aggressively (MV_1); that is, IV_t -+->MV_1.

Major premise. The more legitimate the viewer perceives aggression to be (MV_l), the more aggressively he or she behaves (DV_a); that is, MV_l -+-> DV_a.

∴Conclusion (and initial hypothesis). Therefore, the more televised violence that people view (IV_t), the more aggressively they behave (DV_a); that is, IV_t -+-> DV_a.

In this syllogistic formalization, the conclusion is the researcher's initial hypothesis, whereas the minor and major premises are the researcher's mediational explanatory theory to account for this initial hypothesis. Laying out the theory in this explicit syllogistic form facilitates the researcher's performing elegantly at least nine creatively demanding processes:

1. It facilitates doing a validity check on the variables by checking if the MV is stated essentially the same way in both minor and major premises, if the IV is stated the same way in both the minor premise and the conclusion, and if the DV is stated the same way in both the major premise and the conclusion.
2. It guides doing a validity check on the relations by checking if the two premises have the same sign (both asserting direct or both inverse relations), then the sign of the conclusion's relation should be a plus; and if the two monotonic premises have the opposite signs (one plus, the other minus), then the conclusion should have a negative relation.
3. It detects tautology by checking if the MV is free from conceptual overlap with the IV and with the DV. Overlap is a sign of tautology by revealing that the purported theory repeats the hypothesis rather than explains it.
4. It allows an a priori diagnostic plausibility check. How a priori compelling (obvious) is the major versus the minor premise? Differential plausibility identifies possible weak links (premises) in the theory or alternatively identifies which is the desirably nonobvious premise.
5. It allows elaboration, clarification, and appreciation of the variables in hypothesis and theory by allowing linguistic exploration of IV, MV, and DV by playing word games (McGuire, 1989) that suggest, for example, where one might usefully partition a variable into subvariables that relate differently to other variables in one's experimental design.
6. It permits a check of the independence of alternative theories purporting to give different explanations of the initial IV -+-> DV hypothesis by a pinpointing analysis of whether $MV_1 \neq MV_2$.
7. Particularly enriching, each premise suggests (especially with the help of McGuire's, 1997, 49 creative heuristics) multiple situational and dispositional interactional hypotheses, interesting in their own right, and clarifying the theory. The formalization suggests at least four types of interaction variables (each type including numerous variables) as follow:
   a. Multiple dispositional (across-personal) interactional variables predicted to intensify the minor premise.
   $[_iIV_d \times (IV_t \rightarrow MV_l)] \rightarrow [_iIV_d \times (IV_t \rightarrow DV_a)]$
   b. Multiple dispositional interactional variables predicted to intensify the major premise.
   $[_iIV_D \times (MV_l \rightarrow DV_a)] \rightarrow [_iIV_D \times (IV_t \rightarrow DV_a)]$
   c. Multiple situational (across-conditions) interactional variables predicted to intensify the minor premise.
   $[_iIV_s \times (IV_t \rightarrow MV_l)] \rightarrow [_iIV_s \times (IV_t \rightarrow DV_a)]$
   d. Multiple situational interactional variables predicted to intensify the major premise.
   $[_iIV_S \times (MV_l \rightarrow DV_a)] \rightarrow [_iIV_S \times (IV_t \rightarrow DV_a)]$
8. It analyzes each mediational theory into two or more premises, which allows a posteriori diagnostic empirical tests of the weaknesses and strengths of the component propositions of the overall theory. Hence Number 8, this a posteriori plausibility check supplements the a priori Number 4 plausibility conceptual check.
9. This formalization allows grounding one's theory in depth by deriving each premise as a conclusion explained by its own mediational syllogistic theory. That is, it suggests how each premise of one's initial theory can itself be explained as the conclusion of an antecedent level of theory.

For example, $[(IV_t$ -+-> $MV_o) \& (MV_o$ -+-> $MV_l)] \rightarrow (IV_t$ -+-> $MV_l)$

The research student can be given worksheet exercises (McGuire, 2004b) that guide him or her through such utilizations of theory-formalization until he or she can gain facility in creatively exploiting them, possibly with the help of creative heuristics such as the 49 described in McGuire (1997).

The elegant symbolism and terminology we have worked out and the procedures we have expressed explicitly and formally here are neither pedantic formalisms nor distractions but rather facilitate the researcher's creativity. Several other procedures recommended in this article similarly illustrate how formalizing a variety of complex procedures also allows the researcher to grapple vigorously and to set priorities within daringly complicated experimental designs (e.g., see Figures 1 and 2). Elegant formalization does not stifle or replace creativity but rather releases it for use in grappling with higher, not-yet-formalizable tasks.

On Advantages of Expressing One's Theories in Multiple Modalities

So far I have discussed constructing and expressing theories verbally, in natural language (except that I occasionally repeat or abbreviate the natural language ex-

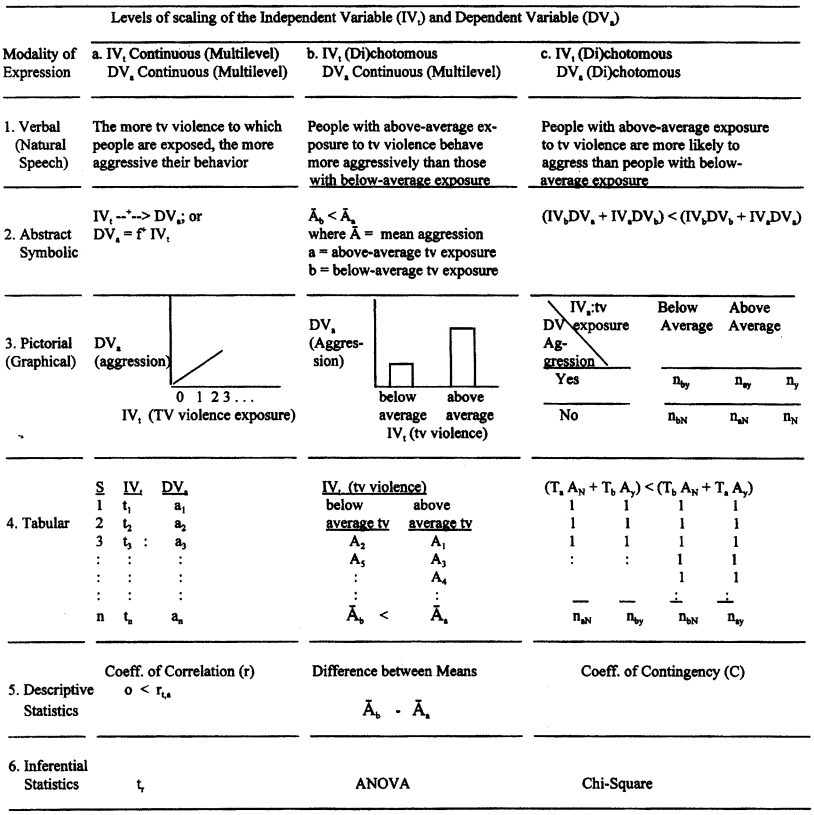

Figure 1. Six alternative modalities for expressing the relation in the initial, main-effect hypothesis (IV_t-$^+$-> DV_a), shown for three common cases as regards scaling the IV and DV variables.

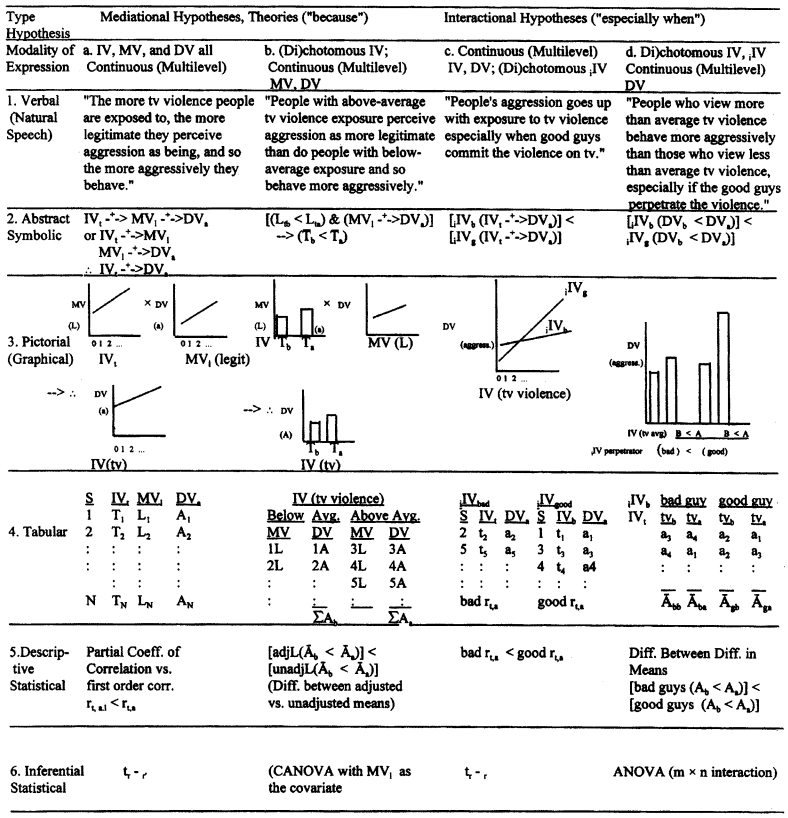

Figure 2. Six alternative modalities for expressing mediational theories and interactional hypotheses, each shown for a pair of common scaling cases.

pression in abstract symbols). And why not? As T. S. Eliot remarked, we have to use words when we talk. However, although one usually expresses one's thoughts in natural language, it is enabling to recognize that there are additional, sometimes more powerful modalities for expressing and constructing one's theories. For specifiable purposes, it may be advantageous to use other-than-verbal modalities, so researchers should be able to switch among modalities. When I teach methods, I try to enhance the students' power and comfort in constructing and expressing their thinking in each of six different modalities: (a) verbal (or natural language), (b) abstract symbolic, (c) pictorial (or graphic), (d) tabular, (e) descriptive statistical, and (f) inferential statistical. These six constitute the row headings of Figures 1 and 2.

Skill in expressing one's theory in multiple modalities is advocated here, not to be pedantic or to engage in show-off tours de force, but because multimodal expressions enrich one's grasp of the theory and increase one's likelihood of noticing its implications, of recognizing its similarities and contrasts with other formulations, of detecting its gaps and weaknesses. Also, researchers vary among themselves in regard to the modality in which they have the greatest personal cognitive strength. For example, researchers differ in preference for geometric versus algebraic styles of thought expression, with the geometric stylists thinking more effectively when they express their theory in the pictorial (e.g., graphical or flow chart) modality, whereas algebraic stylists think more powerfully in the abstract symbolic modality. The neophyte (or even the old pro when dealing with a new topic) may think better in the natural speech modality, but with more familiar topics the theorist may think better in the pictorial modality. For working out one's experimental design, the abstract symbolism modality may be more helpful, but for working out the statistical analysis, the tabular modality may be more facilitating. A given researcher may find the verbal expression more facilitating when engaged in a priori extending or qualifying his or her theory but may find the tabular expression more useful when deciding on an appropriate experimental design.

The cost/utility of the various modalities for expressing a theory depends on the researcher's personal dispositions and on the situational circumstances of the research problem. One should generally choose the modalities that fit one's strengths, but there will be occasions for venturing on roads less traveled. Hence we should help our students to develop some facility in translating theories from one to another modality. To this end, our methods courses (and to some extent our substantive courses also) should (a) convey the concept of diverse modalities of theory expression, (b) describe a variety of contrasting modalities such as the six described previously, and (c) discuss comparative advantages of various modalities.

On Advantages of Expressing One's Theories for Diverse Scaling Cases

Another dimension of complexity (and of opportunity) in theory expression has to do with how the variables in our hypotheses and theories are scaled. We expect the relation between our variables (e.g., IV_t -$^+$-> DV_a) to remain constant in principle across alternative scalings of the related variables, but the expressions of these relations often look dramatically different depending on how the variables are scaled, thus presenting alternative creative challenges and provocations. The student can be sensitized to scaling effects and opportunities by contrasting the expression of a relation when its variables are given maximally different scales, for example, by contrasting dichotomous versus continuous (or at least multilevel) scaling of the variables involved in the relation. Such contrasts are highlighted by comparing adjacent column entries in Figure 1 and 2. A pedagogically powerful device for empowering the research student to make creative use of both the modality and the scaling of the variables in one's hypothesis and theories is to present matrices such as Figures 1 and Figure 2 whose row headings are the six modalities and whose column headings are dichotomous versus multilevel scaling of the variables. (The columns here differ also in the logical structure of the propositions being expressed.) In a methods course, the cells in these matrices would be left empty to be filled in by the student as an exercise, but here the cells are filled in for expository purposes.

Figure 1 expresses the researcher's initial main-effect hypothesis (e.g., IV_t -$^+$-> DV_a; the greater exposure to TV violence, the more aggressive the viewer's behavior will be) in each of the six row modalities. The three columns (a, b, and c) in Figure 1 show this main-effect hypothesis as expressed for each of its three most common scaling cases. Column A expresses this IV_t -$^+$-> DV_a relation in all six modalities when both IV_t and DV_a are scaled continuously (or at least on multilevels); Column B expresses this relation when IV_t is scaled dichotomously and DV_a is multilevel scaled; and Column C expresses this relation when both IV_t and DV_a are scaled dichotomously.

Figure 2 presents two similar matrices with our usual 6 row modalities × 2 column scalings for the two other most popular logical types of hypotheses involved in theory construction, namely, mediational theories and interactional propositions. The two leftmost columns in Figure 2 express the student's mediational theory ($IV_t \rightarrow MV_l \rightarrow DV_a$) in all six modalities for the two most common scaling cases, namely the case in which all three variables, IV_t, MV_l, DV_a, are multilevel scaled (in the leftmost Column A), and for the case in which both MV_l and DV_a are multilevel and IV_t is dichotomous (in the second from left Column B). The two rightmost Columns C and D of

the four columns in Figure 2 yield a matrix that provides the student with practice in the 6-row modalities × 2-column scalings for the third type of logical propositions that enter theorizing, namely, interaction hypotheses, ${}_{i}IV \times (IV_t \text{ -}^{+/-}\text{-> } DV_a)$. Column C expresses the interaction relations for the scaling case in which IV and DV are scaled on multilevels and ${}_{i}IV$ is scaled dichotomously. Column D expresses the interactional relation for the scaling case in which DV is multiplied and IV and ${}_{i}IV$ are dichotomous.

Together Figures 1 and 2, by laying out systematically the most common logical structure, modality, and scaling options in theory construction and expression, familiarize the research student with most frequent styles of theorizing with which he or she will be wrestling. When the cells in matrices like those in Figures 1 and 2 are left blank, the exercise of filling them in provides the student with tailored practice in translating his or her own theories into these different formats. With practice, the unique creative potentials of each cell in the matrices becomes comfortably accessible to the student. Space limitation here restricts us to a few examples of how working with Figures 1 and 2 matrices can advance one's theory-construction powers, but for more details see McGuire (1989, 1999, 2004b).

Theoretical Elaborations of One's Experimental Design Prior to Beginning the Empirical Investigation

The most sophisticated and popular psychology of science prior to perspectivism, the Wienerkreis logical empiricism movement, prescribed that the research should be deductive in using conceptual analysis to derive a hypothesis (and a theory from which this hypothesis could be derived) before setting out inductively on the labor-intensive empirical investigation. Perspectivism is even more demanding regarding the scope of the a priori conceptualization. It prescribes that before collecting data on the relations the researcher should consider explicitly not only the initial hypothesis but also its contrary, and not only one explanation but several explanations of each hypothesis, both the initial hypothesis and its contrary. Thus the researcher should elaborate the experimental design of his or her first empirical study by selecting additional variables sufficient to investigate both the initial hypothesis and its contrary and at least two distinct theories to explain each of these hypotheses. Typically this more elaborate experimental design would involve adding interactional hypotheses suggested uniquely by each theoretical explanation (asserting the hypothesis would obtain *especially if* ...) and adding theoretical mediational explanations (asserting that the hypothesis would obtain *because* ...).

Using A Priori Theories to Generate Interactional Variables, "Especially If ..."

Interactional theoretical elaborations stay within one's initial mediational explanation but exploit its analysis into minor and major premises by using each premise as a springboard for generating additional interactional hypotheses (perhaps by using some of McGuire's, 1997, 49 creative heuristics). For example, using legitimization theory, MV_l, to account for the hypothesized aggression-enhancing effect of exposure to televised violence, $IV_t \text{ -}^{+}\text{-> } MV_l \text{ -}^{+}\text{-> } DV_a$, one formalizes the theory into two syllogistic premises, the minor, $IV_t \text{ -}^{+}\text{-> } MV_l$ (the more violence people are exposed to on television, the more legitimate they perceive the use of aggression) and the major, $MV_l \text{ -}^{+}\text{-> } DV_a$ premise (the more legitimate people perceive the use of aggression, the more aggressive their behavior tends to be). Each of these two premises suggests interaction variables that multiply the premise relation and therefore the conclusion relation, which is the initially predicted hypothesis, $IV_t \text{ -}^{+}\text{-> } DV_a$. This helps the researcher to use each premise to recognize several interesting interactional variables for adding to the empirical design. For example, an interactional variable ${}_{i}IV_g$ is suggested by the minor premise of the legitimization theory, which can be expressed symbolically as ${}_{i}IV_g \times (IV_t \text{ -}^{+}\text{-> } DV_a)$. That is, the more televised violence to which viewers are exposed, the more legitimate the viewers perceive the use of aggression to be, especially if the violence is depicted as perpetrated by the good guys. Note that logically if the interacting variable, ${}_{i}IV_g$ (perceived goodness of the depicted violence perpetrator), multiplies the relation in a premise, it also multiplies (although with probabilistically diminished force) the relation specified in the conclusion (that is, the relation predicted in one's initial hypothesis). Each premise of the explanation suggests numerous situational and dispositional interaction effects, interesting in their own right and clarifying the meaning of the explanatory theory. Several particularly deserving of these interaction variables from each theory should be added to the experimental design.

Using A Priori Theories to Generate Mediational Variables, "Because ..."

A more dramatic theoretical elaboration is the use of multiple (mediational) theories to account for the initial $IV_t \text{ -}^{+}\text{-> } DV_a$ hypothesis. One of the striking postulates in my perspectivist epistemology is that all hypotheses are true. That is, all relations among variables, even mutually contradictory relations, obtain (at least in some contexts, from some perspectives) and each of the hypothetical relations obtains for multiple theoretical reasons, as does the contrary relation (McGuire, 1989, 1999). In terms of William Blake's

Causal Direction / Co-variation Direction	Amount of Violence Viewed Affects --> Amount of Aggressive Behavior			Amount of Aggressive Behavior Affects --> Amount of Violence Viewed		
	Mediational Theory (MV)	Advocating Theorist	Interactional Variable Implication ($_iIV$)	Mediational Theory (MV)	Advocating Theorists	Interactional Variable Implication ($_iIV$)
		QUADRANT A			QUADRANT C	
Positive (Direct) Co-variation	1.Legitimization (desensitization; disinhibition)	L. Berkowitz M. Thomas	good-guy perpetrator, sanitized consequences	7. Ostracism	R. Huesmann	number of sibs
	2. Modeling (social learning; availability)	A. Bandura L. Eron J. Rotter	violence rewarded, victim similar	8. Predilection	A. Fenigstein	control over program
	3. Arousal (excitement)	L. Ross P. Tannenbaum D. Zillman	female less than male, chronic aggression			
	4. Mood	J-P. Leyens	presence of guns, imagery			
		QUADRANT B			QUADRANT D	
Negative (Inverse) Co-variation	5. Catharsis (hydrolic, vicarious)	Aristotle S. Freud S. Feshbach	alternative outlet fantasy life	9. Conventionality	R. Jessor	entertainment value
	6. Time pre-emption	J. Robinson	active in sports			

Figure 3. Four hypothesized directions of relations between amount of exposure to televised violence (IV_t) and amount of aggresive behavior by the viewer (DV_a), each as accounted for by any of several mediational theories, each theory advocated by multiple theorists, and each theory implying several multiplying interactional variables.

Proverbs of Hell, "Everything possible to be believed is an image of truth." Hence, whenever the researcher undertakes to predict and account for (explain, theorize about) a hypothesized relation between variables (e.g., IV_t -$^{+}$-> DV_a, that the persons' levels of exposure to televised violence is positively related to the viewer's levels of aggressive behavior), the researcher should cast a wider net in predicting methodically other implicit directions of relations between the two variables. At the least, the researcher should consider and theoretically account for not only the direction of the initial hypothesis (IV_t -$^{+}$-> DV_a) but also the direction of all four of the 2 × 2 directions shown in Figure 3, including (IV_t -$^{+}$-> DV_a), (IV_t- $^{-}$-> DV_a), (DV_a -$^{+}$-> IV_t), and (DV_a -$^{-}$-> IV_t). Moreover, the researcher should generate multiple theories to account for each of these four possible directions of the relations. The four (2 × 2) directions of the relation include two valences (direct, +, versus inverse, –) × two directions of causality (television viewing causing aggressiveness versus aggressiveness causing television viewing). The four quadrants in Figure 3 illustrate these four directions.

This discussion of theory enrichment is conservative in that it assumes that any IV_t to DV_a relation is confined to that in the upper-left quadrant of Figure 3. That is, we assumed a positive (not inverse) relation between IV_t and DV_a; and we assumed a direction of causality such that TV viewing caused viewer aggression (not aggression caused TV viewing). This narrow focus is not surprising considering that the upper-left Quadrant A relation is conventional wisdom. Still, as a card-carrying perspectivist, I would urge more broadness, a full-court press, by considering the IV–DV relation in each of the four directional quadrants and considering multiple theories to explain the hypothetical relation postulated in each of the four quadrants shown in Figure 3 that constitute a 2 × 2 matrix, 2 covariation directions × 2 causal directions:

> Quadrant A. Exposure to TV violence tends to increase aggressiveness (Hypothesis TV -$^{+}$->Agg).
> Quadrant B. Exposure to TV violence tends to decrease aggressiveness (Hypothesis TV -$^{-}$->Agg).
> Quadrant C. Aggressiveness tends to increase exposure to TV violence (Hypothesis Agg -$^{+}$->TV).
> Quadrant D. Aggressiveness tends to decrease exposure to TV violence (Hypothesis Agg -$^{-}$->TV).

A perspectivist, when hypothesizing any one of these four relations, should investigate the other three also.

Moreover, a perspectivist would exploit the theoretical riches by recognizing that in each of the four quadrants the relation hypothesized in that quadrant can be explained (accounted for) by multiple theories (for Quadrant A these include the four listed and others not listed in Figure 3). So far I have taken my examples only from Quadrant A relations; and in Quadrant A I have considered only one mediating theory, legitimization theory. Figure 3 shows that legitimization theory is only one of four theories listed to account for the upper-left Quadrant A direction of predicted hypothesis relation, TV -$^{+}$->Agg.

1. Legitimization (also known as desensitization or disinhibition) theories have been advocated by L. Berkowitz and M. Thomas, among others (MV_l theory = perceived legitimacy of aggression). One of the interaction-variable multipliers of the hypothesized IV_t -+-> DV_a relation implied by legitimacy theories is that the minor premise relation holds especially when the violence is depicted as committed by the good guys, ${}_iIV_g$. Another interacting variable that multiplies the IV_t -+-> DV_a relation is when the violence is shown in sanitized, low-bloodshed style, ${}_iIV_s$.

2. Modeling (also called social learning or availability) theories shown in Quadrant A of Table 3 have been advocated by A. Bandura, L. Eron, J. Rotter, and others (MV_a theory = availability of aggressive response in the viewer's behavioral repertory). They imply as hypothesis-multiplying interaction variables that the depicted victim look similar to the viewer's adversary, ${}_iIV_s$, and that the TV violence is shown as being rewarded, ${}_iIV_r$.

3. Arousal (or excitement) theories have been advocated by P. Tannenbaum, L. Ross, D. Zillman, among others (MV_a theory = activity level in the viewer). They imply as interaction variables the viewer's chronic or acute activity level, ${}_iIV_a$, or evoking preangered or agitated excitement in the viewer.

4. Mood theories have been advocated by J.-P. Leyens, among others (MV_m theory = hostile mood in the viewer). They imply as interaction variables a vivid imagination or the actual presence of a weapon, ${}_iIV_w$.

Even confining the discussion to the legitimization family of theories in Quadrant A illustrates how syllogistic mediational-theory formalization of just this one legitimization family of its explanatory theories allows derivation of many interaction hypotheses and numerous other predictions, both theory-driven and serendipitous, about relations involving our initial variables, exposure to television violence, IV_t, and viewer aggressiveness, DV_a. A perspectivist can and should also generate multiple relations between the variables and postulate multiple (mediational) theories to account for each of the hypothesized relations. Hence, the rich yield of the one legitimization theory will be multiplied by the number of additional theories perceived to fall in Quadrant A.

This richness of theories is further apparent when it is recognized that the four theoretical accounts just discussed are confined to explaining the relation in the upper-left Quadrant A in Figure 3. When the yields of additional predictions from theories in the other three, Quadrants B, C, and D, are also taken into account, there is a further quadrupling of predictions, many of which can be tested by fairly simple elaborations of the experimental designs, often requiring only that the participants be measured on easily scored, intrinsically interesting interaction variables (e.g., sex of participant, type of stimulus or of effect).

It may appear that perspectivism confronts researchers with an *embarras de richesses*, threatening to smother them under a confusing plethora of predictions, but this danger is containable when the researcher is forewarned and forearmed. The theory-constructing, theory-exploiting procedures described in this article are superficially complex but can be reduced to reiterated recursive routines by methodical organization. The perspectivist can construct pedagogic worksheets (McGuire, 2004b) that provide guidance and practice in dealing with these complexities, enabling the student researcher quickly to develop proficiency in using these riches for creative theory construction and empirical refinement: "aim now known and hand at work now never wrong" (Hopkins, 1998). Training the student researcher in these elegantly complex perspectivist procedures for constructing theory can give him or her courage and capacity to exploit the complexities. Further developments of this perspectivist approach are likely to yield many additional ambiguities, complexities, and enrichments.

References

Doise, W. (1997). Organizing social-psychological explanations. In C. McGarty & S. A. Haslam (Eds.), *The message of social psychology* (pp. 63–76). Oxford, England: Blackwell.

Hopkins, G. (1998). To R. B. In W. Davis (Ed.), *Gerard Manley Hopkins: Poetry and prose* (p. 100). London: Everyman Dent. (Original work published 1918)

McGuire, W. J. (1989). A perspectivist approach to the strategic planning of programmatic scientific research. In B. Gholson, W. R. Shadish, Jr., R. A. Neimeyer, & A. C. Houts (Eds.), *The psychology of science: Contributions to metascience* (pp.214–245). New York: Cambridge University Press.

McGuire, W. J. (1997). Creative hypothesis generating in psychology: Some useful heuristics. *Annual Review of Psychology, 48,* 1–30.

McGuire, W. J. (1999). *Constructing social psychology: Creative and critical processes.* New York: Cambridge University Press.

McGuire, W. J. (2004a). Twenty question sets to be answered by retiring epistemologists. In R. Rosenthal (Ed.), *Papers in honor of Ralph Rosnow.* Manuscript in preparation.

McGuire, W. J. (2004b). Perspectivist worksheets for generating a program of research. In J. Jost, M. Banaji, & D. Prentice (Eds.), *Perspectivism in social psychology: The yin and yang of scientific progress* (pp. 319–322). Washington, DC: American Psychological Association.

Ruben, D.-H. (1990). *Explaining explanation.* London: Routledge.

Ruben, D.-H. (1993). (Ed.). *Explanation.* Oxford, England: Oxford University Press.