SUPPLEMENTING GROUNDED THEORY

Elihu M. Gerson

Prepared for the festschrift honoring Anselm L. Strauss. My intellectual debt to Anselm is obvious, here as elsewhere. Equally important has been twenty three years of encouragement, sponsorship, and moral support. Teacher, colleague, friend, exemplar: Anselm's footsteps have made a broad, smooth highway. I am also grateful to Howard S. Becker, D. Maines, W.C. Wimsatt, and M. Sue Gerson for many very useful conversations and extensive comments on earlier drafts, and to M. Sue Gerson for continuing support.

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TREMONT RESEARCH INSTITUTE
458 Twenty-Ninth Street
San Francisco, CA 94131
415-285-7837 GERSON@IEEE.ORG

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In 1970, writing in the festschrift for his teacher, Herbert Blumer, Anselm posed two problems for the development of grounded theory : "First, how can we use previous theory to discover and formulate more extensive theory? Second, how can we render previous theory more dense, making certain that the final product is also well integrated? (Strauss, 1970: 47)" It seems only fitting to honor Anselm by turning to the same problem, and using his methods to extend his argument one more step. In that paper, and in his work on formal theory (Glaser and Strauss, 1971: 176ff) Anselm made many suggestions for developing grounded theory. Here, I want to propose and illustrate procedures for making the theory construction process more systematic. Theory construction should be more systematic and rigorous for three reasons. First, increased rigor makes the theory construction process easier and more reliable; in particular, it aids in routinizing the work and automating parts of it. Second, increased rigor makes theory construction easier to teach and easier to learn. Finally, increased rigor makes it easier and more practical for others to check the quality of the research.

Anselm built the argument in his 1970 paper on a summary of Davis' classic paper on deviance disavowal (Davis, 1961): "Davis' theory is about: (1) *strained* (2) *sociable interaction* (3) in *face-to-face* contact between (4) *two persons*, one of whom has a (5) *visible handicap* and the other of whom is (6) *normal* (no visible handicap) (Strauss, 1970: 48)." He went on to point out that Davis had carefully delimited the scope of his theory: for example, it applies to the visibly handicapped, not all handicapped people; and to face-to-face interaction between two people, one handicapped, one "normal," not to interaction among many people, or interaction which is not face-to-face, or only among handicapped people. He also suggested several comparisons: the role of secret or invisible handicaps, the history of previous interaction between participants, and the interaction management skills of the handicapped person. Anselm then used this series of contrasts to make his central methodological point:

"This filling in of what has been left out of the extant theory is a useful first step toward extending its scope. We have supplemented the original theory. (Supplementation does *not* mean remedying defects of a theory.) Supplementation has led to the generation of additional categories, which in turn leads us-- unless we cut short our endeavor-- to think about those new categories. Thinking about those categories amounts to building hypotheses which involve them, quite as Davis built hypotheses around the categories generated from his data. We can think about those new categories, one at a time: for instance, the non-visible handicap. We can do this much more efficiently, however, by comparing the new category with others, whether those are newly generated or inherited from Davis (Strauss, 1970: 49)."

Supplementation is a way of constructing new categories for possible inclusion in developing theory. Conceptually, it lies between coding (which names categories and specifies the properties associated with them), and theoretical sampling (which tells us what kinds of site or situation we want to look at next). Supplementation starts with an extant category, and *systematically elaborates contrasting categories* in order to provide the "raw material" for theoretical sampling, cross-cutting and densifying theories, and testing hypotheses. The focus of supplementation is thus on categories, not on data; on "might be" rather than "is." The result of supplementation and elaboration is the condition halfway between the beginning of inquiry in a problematical situation, and its conclusion in a new situation, available (as Dewey said) for "use and enjoyment."

This then, is our problem: how can we use the methods of grounded theory to extend and densify the notion of supplementation? How can we specify the steps which go into supplementation, and codify them so that they can be taught and used efficiently and reliably? Can we define appropriate heuristics, rules of thumb, to guide the supplementation process systematically? Elsewhere, I have suggested a descriptive classification of heuristics used by scientists to evaluate the work of research (Gerson, 1989a,b). Here, I want to explore using a subset of these heuristics as explicit guides to supplementing a developing theory. The paper is divided into three major sections. The first summarizes two groups of heuristics: those which increase and decrease the heterogeneity of phenomena, and those which describe how things fit together. The next section illustrates the use of these heuristics as supplementation procedures, and discusses certain fallacies which should be avoided. The third section makes some suggestions about extending and using supplementation procedures as part of the more general theory construction process. A final section summarizes the argument and makes some remarks on next steps in research on method.

HETEROGENEITY AND COMPOSITION OF DESCRIPTIONS

When we code raw data, we ask: What property of what category does this observation exemplify? This is the basic rule of thumb or heuristic for developing a code from raw data. By analogy, we would like a set of heuristics for supplementing codes and categories once they have been developed. Given a category and some of its properties (whether a new one or an extant one, our own or someone else's) we supplement it by asking two questions. The first is: in what ways are the phenomena covered by this category heterogeneous and homogeneous? The second question is: how are these pheneomena related to one another? Combining the answers to these questions lets us supplement a developing theory and provides the basis for elaborating it. Let us consider each of these questions in turn.

Making things more and less heterogeneous

The first step in supplementing an extant category is analyzing the similarities and differences among the phenomena covered by the category. This can be done two ways. On the one hand, we can consider the category as a single thing, and ask: what sorts of thing are similar to this? What sorts are different from it? On the other hand, we can consider the category as a collection of some kind, and ask: How are the things which go into this similar to one another? How are they different? This is simply a way of using Everett Hughes' principle of analysis: "It might have been otherwise." (e.g., Hughes, 1971: 551). The similarities and differences we list this way are the raw materials for a set of *heterogeneity supplementation heuristics:*

1A: If we have a single thing, treat it as many similar things.
1B: If we have a single thing, treat it as many dissimilar things.
1C: If we have many similar things, find the dissimilarities among them.

2A: If we have many similar things, treat them as a single thing.
2B: If we have many dissimilar things, treat them as a single thing.
2C: If we have many dissimilar things, find the similarities among them.

Consider Hughes' famous example, "Why is a priest like a prostitute?" Here, we use the last heuristic (2C), for priests and prostitutes are clearly dissimilar things, and we are asked to find the similarities among them. These heuristics fall into two groups: those which *increase* the heterogeneity of the data, numbered 1 in the list above; and those which *decrease* it, numbered 2 in the list above. The heuristics within each group are incompatible with one another, in that no two of them can be applied at the same time. On the other hand, corresponding pairs between the two groups (i.e., those with matching letters) are opposite and complement one another in their effect; they are like the two sides of a coin, and so we call them "obverses." These relationships are summarized in Figure 1. The heuristics which increase heterogeneity form the upper right triangle of Figure 1, and the heuristics which decrease heterogeneity form the lower left triangle of Figure 1.

	Start with:		
Treatment:	Dissimilar	Similar	Single
Dissimilar		Increase (1C)	Increase (1B)
Similar	Decrease (2C)		Increase (1A)
Single	Decrease (2B)	Decrease (2A)	

Figure 1. Heterogeneity heuristics.

COMPOSITIONAL RELATIONS

The point of constructing theory is to understand the relationships among the things we study. These relationships can be described and cataloged in an infinite number of ways. But a few relationships appear again and again, in both ordinary usage and research, as ways of describing structure. It seems reasonable therefore, to focus on these very general relationships among things, which I call *compositional* relations. Five of these relations can usefully be discussed here: (1) taxonomic, the relation among kinds; (2) morphological, the relation between parts and wholes; (3) inclusive, the relation among members of a set and the set itself; (4) exemplary, the relation between objects and the categories which they exemplify; and (5) functional, the relation among steps in a production sequence.

Taxonomic composition: the kind-of relation

The kind-of relation relates objects on the basis of common properties. Sub-kinds have all the properties of the containing kind, but have additional properties as well. So, in moving "up" the kind-of hierarchy, we strip away or ignore properties, and in moving "down" the kind-of hierarchy, we add them. For example, we have a category “occupation,” which describes the work that people do for a living. One kind of occupation is “scientist,” which describes people who do research (as opposed to something else) for a living. And one kind of “scientist” is “biologist,” people who do research on living things. More specific kinds have a larger number of properties.

The kind-of relation holds only among categories, and not between categories and concrete individuals. It makes sense to say "biologist" kind-of "professional," but it does not make sense to say that "Charles Darwin" kind-of "biologist." Rather, we must say "Charles Darwin" instance-of "biologist." By restricting the kind-of relation to categories, we may move up and down the hierarchy without getting ourselves into logical difficulties.

Morphological composition: the part-of relation

Another important relationship among categories is part-of. In the traditional children's rhyme, for example, sugar, snips, spice, snails, everything nice, and puppy dogs' tails are all part-of one sort of "person" or another. Like the kind-of relation, the part-of relation is transitive and thus forms logical hierarchies. Hence, we think of, say, "Department of Sociology" part-of "Social Science Division" part-of "School of Arts and Sciences" part-of "University." Of course, the part-of relation can refer to processes as well as objects and organizations; for example "chop vegetables" part-of "fix dinner." Moving up and down in a part-of hierarchy does not add or delete properties, although it may certainly shift attention from one group of properties to another.

Inclusive composition: The member-of relation;
Exemplary composition: The instance-of relation

The member-of and instance-of relations can be described together because they are similar in many ways. The member-of relationship construes something as one of many things belonging to the same set. Set and member must agree with respect to the distinction between concrete things and types of things. For example, it makes sense to say "Charles Darwin" member-of "Linnean Society of London," because this is a relationship among two concrete things, one a person, the other an association. It also makes sense to say "biologist" member-of "professions," which is a relationship between two categories. But it doesn't make sense to say "Charles Darwin" is member-of "biologist," which mixes an individual and a category. Rather, we say "Charles Darwin" instance-of "biologist." The instance-of relationship construes a concrete individual as an example of a category or type. Instance-of applies only to the relationship between specific individuals on the one hand, and categories on the other. The distinction between member-of and instance-of is necessary if we are to avoid certain fallacies in using heuristics; these are discussed below. Both the member-of and instance-of relations are intransitive, and hence do not form logical hierarchies.

Functional composition: The depend-on relation

The depend-on relation describes sequential steps in a production chain. When making dinner, for example, "eat" depend-on "serve" depend-on "cook" depend-on "chop" depend-on "buy." Clearly, depend-on is transitive; but only asymmetrically. That is, the transitivity relationship holds backward in the depend-on chain, but it does not necessarily hold forward.

Thus, eating dinner is dependent on preparing food, but preparing food is not necessarily dependent on eating dinner. Depend-on is the only compositional relation discussed here which has an intrinsic temporal aspect to it. That is, depend-on inherently entails some notion of earlier and later.

The six heterogeneity heuristics and five compositional relations give us a total of thirty ways in which we might think about the relationships among the things we study. This is only a small portion of the total defined in the larger classification scheme (Gerson, 1989b). Each of these combinations provides a way of supplementing a developing theory by posing contrasts for further examination. Let us turn to a consideration of their use.

SUPPLEMENTING THEORY SYSTEMATICALLY

Supplementation is equivalent neither to testing hypotheses on the one hand, nor to constructing new categories via coding on the other. Indeed, it can be done without reference to particular data at all, focussing instead on the conceptual organization and relationships of the developing theory. Keeping the theory in a state of permanent confrontation with data is the work of theoretical sampling, not of supplementation. Put differently: theoretical sampling tells us what to worry about; supplementation tells us the terms in which we should worry about it.

To see how this works, let's start with a theoretical statement to serve as raw material:

> "When diseases become complex and multi-faceted, they require the services of a wide variety of medical specialties, each with its own perspective on treatment and the evaluation of the myriad trade-offs and contingencies among alternative treatments. Patients with many physicians run the risk of becoming embroiled as innocent victims in disputes over whether surgery or chemotherapy is the appropriate procedure; over the advisable dosage limits to powerful or dangerous drugs; over the jurisdictional boundaries between physicians whose work overlaps; and in a variety of other possible disputes... Thus, a patient may find himself taken off and returned to and again taken off a potentially habit-forming drug; or discover that an uncomfortable or intrusive diagnostic procedure has come to naught because of technical disagreements among physicians on the appropriate methods of analysis." (Gerson, 1976: 222)

We supplement categories by substituting terms appropriately for the compositional relation we're using. Anselm and Barney Glaser developed this idea in the last chapter of "Status Passage" (Glaser and Strauss, 1970). But we don't want to supplement every category at once, for this will add too much complexity to deal with effectively. Let's use the kind-of relation in our example here. Then we would change "physician" to "professional" and "patient" to "client". Of course, we should also replace terms specific to the medical context. For example, we might call "dosage limits to powerful or dangerous drugs" kind-of "risks associated with technology." Similarly, any complex organization will show disagreement among professionals, not just hospitals as in this case. We may also broaden the reference of analytical categories:, substituting "forms of interaction" for "dispute" for example. Our re-written example might read:

> When a client's problems become complex and multi-faceted, they require the services of many technical specialties. Each specialty has its own perspective on appropriate procedures and evaluation of the myriad trade-offs and contingencies among them. Clients working with many professionals run the risk of becoming embroiled as innocent victims in disputes over alternative technical options, over the risks associated with procedures, and over the jurisdictional boundaries of the division of professional labor.

This gives the appearance, but not the substance, of increased generality. In order to make it real, we have to look at the same kinds of relationships in other contexts. The next step then, is to examine different situations in which clients deal with multiple professionals simultaneously. For example, we might look at chemical companies building new plants, and their dealings with architects, structural engineers, geomancers, and chemical engineers; or we might look at business managers dealing with lawyers, accountants, engineers and insurance underwriters. In each case, we would look for variations in the strategies used by clients to handle the difficulties which arise, and try to relate them to the structural conditions of the work context.

Notice that we have substituted kinds for sub-kinds here. We might just as easily have done it the other way, substituting sub-kinds for kinds. Rather than substituting "client" for "patient," for example, we might have substituted varieties of patient: chronically vs acutely ill, or privately insured vs medicare vs uninsured. Since there are always many ways to choose relevant sub-kinds, the particular approach we use is dependent on the research problem we have in mind; some strategies for choice are discussed in the next section.

Just as supplementation via the kind-of relation begins by substituting kinds and sub-kinds, so supplementation via the other relations begins by substituting wholes and parts, members and classes, and earlier and later production steps.

Fallacies and failures of supplementing

Using the heterogeneity and compositional heuristics to supplement a theory is a powerful technique, but it has its dangers. One major problem is that these are heuristics, rules of thumb, not algorithms. That is, they are not guaranteed to work; indeed, they are inevitably biased and will fail in characteristic ways under certain circumstances (Wimsatt, 1986). Using these heuristics safely and effectively therefore requires an understanding of the ways in which they are likely to fail, and a good deal of care in their use. For the heuristics described here, several different fallacies arise out of logical errors in substituting. A pair of examples will serve to make the point.

When substituting members and classes, it is important to avoid substituting kind for class (or instance for member) at the same time. This typically occurs when we compute a summary statistic for a set, and then forget that the statistic describes a distribution. For example, from the fact that Blacks have higher crime rates than whites, one cannot infer that "the Black race" is more criminal than "the White race." Similarly, one cannot infer from the properties of aggregates (i.e., sets) to those of individuals (i.e., instances); the fact that Blacks have higher crime rates than whites cannot be used to infer that the next Black I meet is a criminal. This is true whether or not other variables such as class, age, gender, or location are correlated with either race, crime rate, or both. Put this way, in the familiar context of a long debate, the point seems so obvious as to be hardly worth mentioning-- but subtle variations on it are very frequent.

Another substitution fallacy arises from mishandling the depend-on relation. We often substitute *predecessor* steps in a production chain as a way of "opening up" the work structure in a situation. In the example I quoted above, we might consider exposure to infection, genetic propensity, or malnutrition as prior steps in the "disease" chain. Or we might look at the steps which go into "chemotherapy" or "surgery;" knowledge of physiology, anatomy, and pathology; use of various diagnostic procedures, availability of particular equipment, and so on. A strategy of substituting *backwards* in the depend-on chain is always useful, because it leads immediately and naturally to thinking about how "it might have been otherwise" (Hughes, 1970: 551), and thus to interesting theoretical sampling points. Substituting *forward* in the depend-on chain, by contrast, is often fallacious; for example, people do not malnourish themselves *in order to* become sick. Of course, people do have purposes: one goes to medical

school in order to learn physiology and anatomy and pathology in order to heal the sick. The fallacy arises when purposes are assumed without justification, or imposed by the observer. This leads to what some biologists call "just so" stories (Gould and Lewontin, 1979): *ex post facto* justifications, not explanations, of the ways things are. A related difficulty with depend-on chains arises when analysts ignore the temporal character of the depend-on relationship, thus converting a historical process into something which looks vaguely like a part-whole relationship. Finally, it is important to keep in mind that "depend-on" is not the same as "cause." Illness may depend on malnutrition, but malnutrition is, in general, neither sufficient nor necessary to cause illness.

With these fallacies in mind, we may turn now to the technqiue of using these heuristics as part of the work of theory consctruction.

SUPPLEMENTATION STRATEGIES

We can think of the developmental course of a theory as a sequence of supplementation steps, in which we apply the various heuristics in different ways. The number of supplementation sequences which might be explored is astronomical, even for the simplest and smallest projects. For example, with the simplified heuristic classification used here, there are thirty options at each supplementation step of the research. A two-step project then has nine hundred possible paths, and a three-step project twenty-seven thousand possible paths *for each category in the theory*. Clearly, the most urgent necessity for supplementing theory is a set of guidelines for throwing away or ruling out possibilities. Usually, the research problem defines a few sequences as interesting and worth following up, and most sequences as uninteresting. And of course, the clearer the research problem, the more this is true. But often the research problem isn't all that clear to begin with, and problems are routinely re-constructed as we go along in the work in any case. And let's face it: people are going to pile up thousands of pages of field notes without thinking very much about what they're doing, and we might as well try and have something useful to say to them when they show up looking frustrated. What we need then, are heuristics for supplementing, i.e., rules of thumb which will guide us in choosing one supplementation path over another. In short, we need heuristics for using heuristics: reliable ways of choosing commitments to alternative problems, categories, and models.

One such strategy seems very promising: working back and forth systematically between increasing and decreasing heterogeneity. This involves alternating among three pairs of procedures based on the heterogeneity heuristics. The first pair, which we call *differentiation*, goes from one thing to many things. The second pair, which we call

reallocation, goes between many similar and many dissimilar things. The third pair, which we call *homogenization*, goes from many things to a single thing.

Conceptualized this way, we can see the supplementation process as made up of two parallel cycles, each of which goes through the steps differentiate -> reallocate -> homogenize -> differentiate and so on. In Figure 2, the table of Figure 1 has been recreated using icons instead of tabular cells; the number of small arrows entering and leaving each icon indicate the relationships between one and many. Similarity and dissimilarity are represented by solid and dashed small arrows.

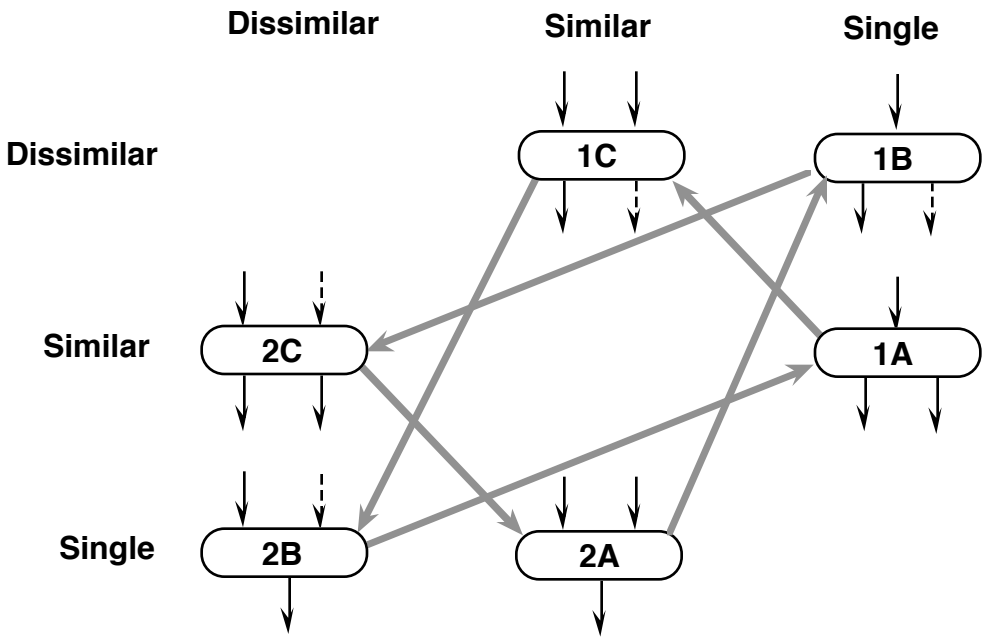

Figure 2. Differentiate - Reallocate - Homogenize cycles

We can start a cycle on either heuristic which has a single thing as starting point (1A or 1B in Figure 2). The ending point of one heuristic in terms of number and similarity is the starting point for the next heuristic. Because there are two starting points, we have two cycles which do not overlap. In Figure 2, the two cycles are: 1A ->1C -> 2B -> 1A -> ... and 1B -> 2C -> 2A -> 1B -> ... We switch from one cycle to another by transferring to the obverse heuristic, i.e., one with a matching letter in Figure 2. Thus, at every point in a sequence there are two options for the next step: continue along the current cycle, or switch to the other cycle via the obverse heuristic. A moment spent tracing the two cycles in Figure 2 will make things clear.

Differentiation

Differentiation aims to increase the heterogeneity of the things we are working with. The procedure thus begins with a single category or process and results in a list of categories, properties or processes. The starting category will often be one we have generated by coding, but it might as easily come from elsewhere. As an example, let's start with the category "profession."

Choose a compositional relation, and apply it to the category. If it is one of the relations that forms hierarchies (kind-of, for example), apply it "upward" to get the containing kinds: occupation, in this case. Then, list the other sub-kinds of the kind thus identified; or, more generally, the other things which bear the same relationship to the new category as is borne by the original category. In our example, we list other kinds of occupation which are not professions: farmers, craft workers, factory operatives, and so on. This gives us a list of categories which are *conceptual siblings* to the category with which we started. Our single starting point has now become a list of many dissimilar things.

We take things further by sorting the list of conceptual siblings according to the similarities and differences among them. Similar and different in what respect? The criterion for deciding must come from the research problem, or some other source external to the supplementation process. We know something about the similarities automatically, for all the siblings have the properties of the containing kind: e.g., all occupations are ways of making a living. So one concern now might be to focus on the *differences* among the sibling categories. That is, we've started at 1B in Figure 2.

Once we have the list of different conceptual siblings, we associate them with other differences of interest to us. For example, professional occupations tend to have many specialties. Do other occupations? Are disputes among non-professionals associated with specialization in the same way as they are with professions? This is the strategy of going from one thing (professions as a kind of occupation) to many dissimilar things (differential dispute rates among kinds of disciplines as a function of differential specialization).

Alternatively, we can start on the alternate cycle, and adopt the strategy of going from one thing to many similar things (that is, start at 1A in Figure 2). We might ask, for example, how professions are similar to other kinds of occupation. In practice, this point has traditionally been addressed by attempting to list the criteria which delimit the professions from other occupations, and this way of handling the problem is an effective one as often than not. But we can delimit just as easily by posing tentative *dissimilarity* criteria (e.g., "professions have control over peoples' identities") and seeing if they *fail* (e.g., police officers control peoples' identities; are they professional?). Roth (1974) has applied this form of argument to

the definition of "professional" with excellent effect. Obviously, when we have a precisely defined category already this strategy won't help much. Rather, the strategy is most effective when we have a lot of vague ideas which we want to sharpen. It is particularly useful for forcing us to specify in what ways we think of things as similar to one another.

The differentiation process thus creates lists of similar and dissimilar things, in terms of a compositional relationship vis-a-vis a starting category. There are several things we might do at this point, in order to carry on the research. We might start theoretical sampling in order to refine our knowledge of the categories further. Alternatively, we might try a different supplementation strategy by differentiating the same original category along a different compositional relation. We would do this when we wish to saturate a category or process as quickly as possible. Or, we might continue along the same supplementation cycle.

Since differentiation starts with one thing and ends with many things, the next step in the supplementation cycle begins with either many similar things or many different things. If we started with 1B, we have many dissimilar things, and we may go on to reallocate at 2C, or we may switch cycles by obverting and go on at 2B. Let's continue here by reallocating the lists which resulted from the differentiation.

Reallocation

There are two kinds of reallocation heuristic: one goes from many similar things to many dissimilar things (1C in Figure 2), and the other goes from many dissimilar things to many similar things (2C in Figure 2). Both are, at bottom, ways of sorting and re-sorting. The starting point for reallocation is a list of categories which have some properties in common, e.g., doctor, lawyer, clergy, engineer, all of which have the properties of professions. We sort the list into two sub-lists based on similarities and differences. For example, the professions are similar in that they all seek to control the market for their services. They differ in their age, sex, and race compositions, and in their relative prestige vis-a-vis other professions.

Choose a property in which the professions differ; say, the gender composition of their practitioners. Some professions are almost exclusively male (e.g., military officers, clergy), others are predominately female (e.g., nursing), others are intermediate (teaching, medicine, law).

Sort the list of professions by the chosen dissimilarity property, and recode accordingly: in our example, we thus recognize female professions, mixed professions, and male professions. Then, choose a compositional relation and apply it to the starting category to obtain a new category; e.g., profession kind-of occupation. Finally, substitute this new

category into the recoded categories generated in the previous step: female occupations, male occupations, mixed-gender occupations.

This completes the reallocation, which has mapped many similar things (professions) into many dissimilar things (occupations with different gender compositions). Notice that this is not simply a matter of aggregating similar instances together, but rather of *re*-aggregating them along different lines.

The obverse reallocation process follows an analogous series of steps. It begins with a list of dissimilar things, construes them as similar in some respect, homogenizes to a single category via one of the compositional relations (see below), and sorts the resulting list according to the newly constructed similarities.

Homogenization

Homogenization is the opposite of differentiation; it aims to decrease the heterogeneity of the things we are working with. Homogenization begins with a list of observations or categories, and results in a single observation or category. The procedure has three steps. First, compile a list of observations or categories which are similar in some respect. Then, construe the items on the list as related to some new category by one of the compositional relations. Finally, name the new category, and list its other properties if possible.

For example, suppose we observe nurses deferring to physicians in hospitals. This presumably summarizes a list of observations extracted from field notes: Nurse Smith deferred to Dr. Jones on Monday, Nurse Brown deferred to Dr. Robinson on Tuesday, and so on. We construe these incidents as instances of a new code, "nurse-physician deference in hospitals." A little field-work reveals many similar situations: technician-physician deference, physician-accountant deference, accountant-lawyer deference, lawyer-gangster deference, and so on. Using the kind-of relation and homogenizing, we generate the new category “inter-occupational deference.”

By differentiating, reallocating, and homogenizing sequentially, we can build arbitrarily complex strategies for supplementing the categories of grounded theories. Further, by keeping track of which strategies we use and the order in which we use them, we maintain a record of the analysis which supports colaborative research with others, and aids in checking the reproducibility of our results.

Supplementing processes and properties

This discussion has focussed on supplementing categories. We can also supplement processes and properties in analogous ways. Supplementing processes is just like supplementing categories; indeed, a process can be treated as a category (or, better, vice versa). For example, consider the process of seeking information about course requirements in college described by Becker, Geer, and Hughes (1968: 80): "[Students] are concerned, on the one hand, with finding out what the professor expects them to do in return for a 'good grade.' On the other hand, they want an accurate current appraisal of where they stand as measured by their GPA." Becker, et. al. describe many strategies which students use to acquire this information: they ask professors directly; they focus narrowly on the "mechanics" of examination arrangements; they compare and contrast the stories put out by professors, older students, and others; they try to discover professors' tastes and pet peeves; they develop "systems" or models to predict professors' actions. Each of these strategies is a process which is part-of the larger "seeking information" process, and this in turn is part-of getting a good grade point average. We can apply the different supplementation procedures to these processes in order to supplement a developing theory, just as we do when supplementing categories.

We can also supplement the properties of the categories we use, rather than the categories themselves. This approach is complementary to supplementing categories, and the two always go together in a theory construction research context. Supplementing properties is the mirror image of supplementing categories; the same heterogeneity heuristics and compositional relations apply. We can start with a single property, and end with a list of multiple similar or different properties; or we can begin with a list of similar or different properties and end with a single property. When we use the processes of differentiation, reallocation and homogenization to supplement categories, we refer (tacitly or explicitly) to some criterion *property* to frame the boundaries of "similar" and "different." When we use the same processes to supplement properties, we must use some criterion *category* to frame the boundaries of "similar" and "different" in the same way.

So, for example, when Glaser and Strauss developed the theory of awareness contexts (1967b), they elaborated a theory around certain properties of interaction: open awareness, closed awareness, pretense, and suspicion. These properties refer to interaction between people, and "person" serves as the reference category in the theory. Extending this reference category to interaction between organizations, or interaction between animals, or between computers, or among any pair of these would undoubtedly reveal properties of awareness contexts which were not developed in the original research. But in any case, the mechanics of the supplementation process are along the same lines for properties as they are for categories and

processes. The principal difference comes in using properties where one would ordinarily use categories and vice-versa.

Supplementing in different directions

Differentiation, reallocation and homogenization tell us how to supplement categories systematically, but they don't provide much guidance for choosing one heterogeneity or compositional heuristic over another. The structure of the research problem always provides guidance of course, as do practical considerations like the nature of the data available, the amount of time and budget we have, and the prejudices of sponsors and referees. All these tell us a lot about which kinds of supplementation procedures to use, but we still need ways of structuring the over-all course of the research. I have three suggestions along these lines.

First, we can supplement so as to provide the broadest scope to the resulting theory, making it as general as possible. To do this, we should prefer supplementing with heterogeneity increasing heuristics rather than heterogeneity decreasing ones wherever a choice arises. We should also go up rather than down in the transitive hierarchy of any compositional relations we use whenever possible, looking at containing kinds rather than sub-kinds, and wholes rather than parts. This strategy leads to increasingly abstract and general knowledge, i.e., knowing less and less about more and more by generating ever more comprehensive categories. Anselm's theories of status passage (Glaser and Strauss, 1971) and negotiation (Strauss, 1978) are the outstanding examples of this approach in his work.

Second, we can supplement in the direction of another theory. This is a way of cross-cutting and densifying extant theories, so that they grow together in a complex web of mutually supportive relationships. The basic strategy for working this way is to use the categories of one theory whenever the supplementation process in another theory calls for using a new category; i.e., whenever we use one of the compositional relations to connect two notions. For example, if we want to develop a theory of inter-occupational deference, one way to do so is to use, say, the categories of awareness context theory (Glaser and Strauss, 1967b). This yields ideas about inter-occupational deference and closed, open, and mutual suspicion awareness contexts: for example, are closed contexts more or less prevalent when the participants are the same gender, or of different gender? Does the relationship hold when the occupations are dominated by the same gender, or different genders? Again, Anselm's work on status passage and careers (Glaser and Strauss, 1971; Strauss, 1971) are outstanding illustrations of this approach.

Finally, we can supplement toward exhaustive description of a particular situation or class of situations; that is, develop an increasingly dense substantive theory, seeking to know

more and more about less and less. We do this by letting the situation of interest control our choices whenever we need a new category, a sorting dimension in reallocation, or a move downward in a compositional hierarchy. Thus, if we are interested in the work organization of hospitals (as opposed to non-medical institutions, or other kinds of organization), we should choose categories relevant to hospital situations when differentiating, reallocating, or homogenizing. If we need a list of occupations, choose the occupations that work in hospitals. If we need a sorting dimension for reallocation, choose one which is significant for hospital organization. The best example of this approach in Anselm's work is his study of work organization in hospitals (Strauss, et al 1984).

CONCLUSION

In this paper, I have attempted to extend Anselm's work an additional step by developing his notion of supplementation, with an eye toward making the theory construction process more rigorous. My strategy in doing so is to make use of a classification of research heuristics to suggest a set of procedures for supplementing a developing theory. Two groups of heuristics are used to accomplish this. The first group of six heterogeneity heuristics is concerned with manipulating similarities and differences among observations, categories, processes, and properties. The second group of five compositional relations is concerned with the ways in which objects, processes, categories and properties fit together. Combining the two groups gives a total of thirty kinds of heuristic which can be used in supplementing theory.

These heuristics can be combined to form three general supplementation procedures: differentiation, reallocation, and homogenization. Differentiation begins with a single category or property and forms multiple categories and properties. Reallocation begins and ends with many things, rearranging and recombining them into new patterns. Homogenization begins with many things, and ends with fewer, more similar things, or a single thing.

By applying these three procedures systematically and repeatedly, we can develop our theories in several ways: toward maximum coverage or generality, toward other theories in order to cross-cut and densify them, or toward exhaustive description of a particular setting or class of settings.

Anselm and Barney Glaser wrote *The Discovery of Grounded Theory* at a time when restricted and reductionist ideologies of research method were at an all-time high in terms of influence. This was true, not only in sociology and its sister social sciences, but in many other disciplines as well: statistics, philosophy, computer science, and many branches of population

biology, for example. In the mid 1960's, one was obliged to explain that research which did not test hypotheses explicitly really was science after all; and the explanations were usually unsuccessful, for the conventional methodological wisdom and philosophy of science of the time held to the contrary (cf., e.g., Hempel, 1965). It was simply *wrong* to discover instead of verify. I remember receiving a grade of "D" from a world-famous expert on bureaucracy, because I developed a new hypothesis in a term paper when the assignment had been to propose a test for an extant hypothesis. In a context where "intellectual freedom" meant "you don't have to find the hypothesis in *my* publications," the *Discovery* book came as a cleansing river rushing through the stalls of sociology.

The *Discovery* book was about better and worse ways of doing research. It was not about "qualitative" vs "quantitative," and it did not advocate creation of new categories or theories in place of methodological rigor. Rather, it advocated creating new categories and theories rigorously. The core objection to verificationist thinking was that restricting research to hypothesis testing was *insufficiently* rigorous; that verificationism is an absurdly restricted and inadequate vision of research. There is an important lesson in the argument of the *Discovery* book: rigor and creativity go together and support one another. The lesson bears repeating today, when the fashion has swung back toward unrestricted speculation. It is important not to lose sight of that lesson, or mistake it for the specious claim that rigor and creativity are antagonistic. This, more than anything else, is the lesson which Anselm has taught us: one can discover systematically.

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