

# Why I am a Psychology Major: An Empirical Analysis of Student Motivations

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**Abstract.** The underlying “architecture of the decision to pursue a degree in psychology was quantified using the Method of Sorting technique to identifying the critical issues necessary to make this choice. Multidimensional scaling procedures were employed to construct a three-dimensional map representing the relationships between reasons for selecting psychology as a major. Freshman and senior psychology majors ( $N = 165$ ) from a regional university and a large research-based institution rated the relative importance of items in their decision-making process. Hierarchical clustering procedures revealed seven different groups of students. Although significant differences associated with class standing were not found, institutional affiliation did influence cluster composition. Reflecting local emphases, students at the regional institution had a greater interest in Counseling Psychology, whereas those at the research-based school focused on Clinical Psychology. This semantic map and the associated item clusters arising from psychology student data provides an empirical basis for, amongst other things, course selection, faculty-initiated program design or revision, strategic niche marketing, and student retention.

**Key words:** Method of sorting, multidimensional scaling, cluster analysis, undergraduate curriculum

## 1. Introduction

McKeachie (2002) begins the latest edition of his *Teaching Tips* pointing out that teaching involves active thinking on the part of both teacher and student. He argues that what goes on in students’ minds is most important, and a critical task for the teachers is to recognize students hold expectations, experiences, and conceptions that shape their interpretations of the knowledge being presented. Despite the face validity of this comment, little systematic effort has been extended to assess subjective appraisals of students electing to pursue a particular course of study. Knowing students’

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expectations about a formal program of study could be quite useful in assisting faculty to know their audience and plan their curricula accordingly. Understanding the reasons for students enrolling in a particular class and their expectations for that course, or even the entire major, should enhance professors' abilities to connect with their students.

Researchers have long known that expectancy and value affect the individual's motivation for learning (Atkinson, 1964; Feather, 1982, 1988; Eccles, 1983; Wigfield and Eccles, 1992; Cross and Steadman, 1996). Psychology professors may *know* that a substantial background in theory, quantitative methods, and research design is critical to understanding the nuances of human behavior, but there is little reason to expect or believe that their students will share this opinion. Just as a school age child may bitterly reject algebra arguing that it is something they will never use, a college student may not understand why many of the courses they take are required of them to become professionals. University faculty may establish a more successful means of instruction by identifying the expectations and the values placed on the coursework by students, and then formulating a plan to address these expectations, values, and motivational factors (cf., Hofer, 2002). University teachers who acknowledge the variance in student motivation when preparing their course objectives are afforded an opportunity to maximize students' understanding of course material by demonstrating the relevance of this material to their students' goals. Recognizing students' underlying desires and motivations as they pertain to the application of the material should create a stronger, more unified process of developing the knowledge base. If one assumes that goals and motivations will change as students move through the curriculum, then we face a "moving target" situation implying there will be some students who are sufficiently defined to make the connection between the materials being presented and how these will enhance their futures while others may not be so in tune. Having this connection should increase the motivation to learn the material. Of course, the concept of a moving target also implies that faculty should expect that students will be making progress toward completion of the transition to young adulthood throughout their undergraduate years. McKeachie summarized this orientation when he observed, "one of the major tasks in teaching is not how to scare students into doing their homework, but rather how to nurture their curiosity and to use curiosity as a motive for learning" (1994, p. 350). In a later edition of his text, McKeachie noted, "our task is to help students understand that they can take more responsibility for their own learning" (2002, p. 280).

These considerations prompted four major classes of questions and served to guide this investigation: (a) what is the underlying "architecture" of the decision to pursue a degree in psychology? Or, alternatively, are the reasons for pursuing the study of psychology related as a

coherent whole so that an empirical assessment of individual subjectivity might be possible? (b) Do the reasons for being a psychology major change over the course of the undergraduate years? That is, do freshmen enter their collegiate years with expectations and values that are qualitatively different from those of seniors? (c) Are the students at large, research-based institutions qualitatively different in their expectations and values for the study of psychology than their counterparts at smaller institutions that focus primarily on providing a distinctive undergraduate experience? (d) Can the assessment of subjective reasons for pursuing a course of study provide information that might be useful to the faculty responsible for curriculum revision or development at the institutions involved?

## 2. Method

It is helpful to conceptualize this project in three distinct phases. In the first phase, *item selection*, 72 specific reasons for becoming a psychology major were obtained. The second phase, *map construction*, was itself a two-step process resulting in a three-dimensional presentation of these reasons. The third phase, *subjective reflection*, focused on obtaining data on the reasons for becoming a psychology major and then using these data to derive clusters of similarly disposed students.

### 2.1. ITEM SELECTION

Twelve undergraduate research assistants each interviewed several psychology majors to find out why they had selected this discipline as their primary course of study. Specifically, interviewees were asked to complete the prompt "I became a Psychology major because . . . ". Interviews with 78 psychology majors provided over 200 responses that were reduced to 30 after duplicated and highly idiosyncratic responses were removed.

The items were supplemented with 42 statements expressing interest in the activities of the following divisions of the American Psychological Association: Experimental; Evaluation, Measurement and Statistics; Behavioral Neuroscience and Comparative; Developmental; Personality and Social; Clinical; Industrial and Organizational; Educational; School; Counseling; Military; Adult Development and Aging; Rehabilitation; Behavior Analysis; Mental Retardation and Developmental Disabilities; Religion; Health; Family; Lesbian, Gay, and Bisexual Issues; and Exercise and Sport sections of the American Psychological Association (2001). These 72 items were numbered for identification, printed on individual cards for sorting (see Appendix A).

## 2.2. PARTICIPANTS

Twelve undergraduate research assistants from three universities in the Midwest collected data at their own institutions. The University of Michigan at Ann Arbor (UM) and Michigan State University (MSU) are very large, research-based, doctoral institutions, and Oakland University (OU) is a moderate-sized institution with limited graduate study and no graduate study in psychology. The initial 78 interviewees were a convenience sample of psychology majors from the three institutions who volunteered to complete the very brief interviews in moments before or after scheduled lectures.

The psychology majors ( $N = 75$ ) who participated in the second, two-step, phase of this project represented the three institutions (OU  $n = 30$ , UM  $n = 26$ , MSU  $n = 19$ ). Because the systems used by these academic institutions to define class standing (year of study) varied, we defined *naïve majors* ( $n = 39$ ) as students who were currently enrolled in their first or second psychology class and *experienced majors* ( $n = 36$ ) as students who had completed at least eight courses in psychology. The participants from each institution were uniformly distributed into the naïve and experienced groups. For the second step of this map generation phase 50 experienced majors participated (OU  $n = 18$ , UM  $n = 17$ , MSU  $n = 15$ ). In the third and final phase of the project, 87 psychology majors from UM ( $n = 26$  naïve and  $n = 52$  experienced) and OU ( $n = 35$  naïve and  $n = 52$  experienced) participated.

## 2.3. MAP CONSTRUCTION

In the second phase of the project, participants completed a card sorting task developed by Bimler and Kirkland (1998, 2001, 2003). First, the participants sorted the entire deck into piles according to self-determined logical similarity with the proviso that no pile ought to have more than seven items. Next, they identified up to three pairs of piles most different from one another. Third, they partitioned the piles of items created in the first step into subgroups. Finally, they re-combined the phase one piles into a few superordinate groups. Bimler, Kirkland, and their associated refer to these sorting procedures by the acronym GOPA (group, opposite, partition, and add) and they have employed it to obtain data necessary to construct semantic maps of a wide range of topics. Data are subsequently analyzed using multidimensional scaling, applying an algorithm created by Bimler.<sup>1</sup> A three-dimensional semantic map revealing the perceived similarities and differences among the items was obtained. Unfortunately, these data included so much variability that the algorithm failed to converge to provide an acceptable map, i.e., the Kruskal Stress-1 “badness-of-fit” was unacceptably high.

The data set was partitioned into two groups according to experience. Despite the relatively small sample sizes in these two groups, the data were analyzed separately. It was apparent that intersubject variability was inversely related to the number of courses completed: only those students who were experienced majors provided data sufficiently structured for MDS to reveal a relatively good map. That is, the dissimilarity matrix based on GOPA sorts of the students who had taken more psychology courses produced a reasonably good map whereas the analysis based on the sorts of students who had taken fewer psychology courses failed to converge to provide a good-fitting solution. This makes intuitive sense if one considers that students in their first or second course in psychology may not have acquired enough information concerning the discipline to organize their rationalization for the major in a consistent manner.

Fifty senior psychology majors who did not participate in either the initial item selection phase nor in the first attempt at map generation were recruited from the UM and OU campuses to complete the same GOPA card-sorting task developed by Bimler and Kirkland (1998, 2001, 2003). The items within each of the groups were again recorded and the algorithm created by Bimler was again utilized to derive dissimilarity matrices that were submitted to a classic non-metric multidimensional scaling (MDS) procedure to obtain a three-dimensional semantic map revealing the perceived similarities and differences among the items. A good-fitting map was obtained,  $Stress-1 = 0.33$ , replicating the prior result with the more experienced psychology majors. This map is presented as Figure 1.

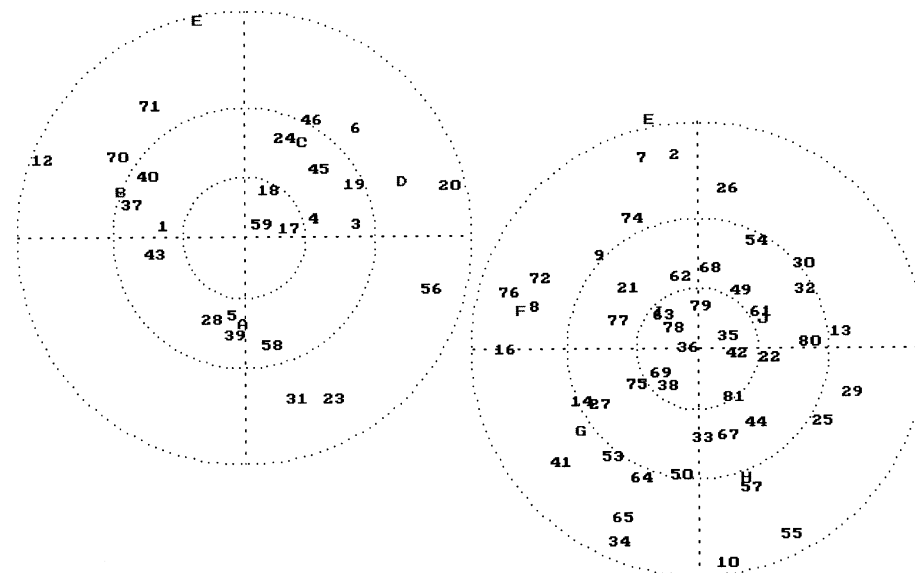


Figure 1. Polar projection of the items and hotspots.

Naïve and experienced psychology undergraduate students ( $N = 165$ ) from the UM in Ann Arbor and OU completed another sorting procedure using the same deck of 72 cards. This procedure, based on Block's (1978) Method of Successive Sorting (MOSS) asks respondents to distribute the items of the deck along a seven-point continuum to indicate how applicable each item was to their decision to become a psychology major. Specifically, participants were asked to sort the deck into three piles representing "applies to me," "uncertain," and "does not apply to me." Participants then made finer distinctions with the "applies" and "does not apply" piles by dividing each into three piles. The number of items in each pile was not pre-determined, but participants were encouraged to keep each split roughly equal. Piles were numbered from +3 to -3 and these numbers were conceptualized as the ranking of the importance of each item for each respondent.

These ranking data were submitted to a data-reduction technique known as "subjectivity profiling" or "hotspot modeling." Bimler and Kirkland (2001) describe the stages of the process in detail. (The interested reader may also consider Trochim and Linton's (1986) "concept mapping" to learn more about subjectivity mapping techniques.) the objective of this analytic procedure is to identify a small number of "neighborhoods" within the three-dimensional map created by the GOPA-sorting procedure, each corresponding to a separate major domain of psychological or semantic meaning, theme, or "content area." The central meaning of each domain is represented by an abstract point or "hotspot," located within the neighborhood so that the proximity of a given item-point to the hotspot indicates how well that item captures the domain's psychological content. Summing the ratings given to the items by a participant, weighted by their proximity to the hotspot, yields a score summarizing how large or small a role the domain played in that participant's underlying reasons for becoming a Psychology major; a combination of scores, one from each hotspot, summarizes the ranking data obtained through the MOSS procedure. This can be interpreted as a "radial basis function decomposition" (Bimler and Kirkland, 2001).

Clearly, these scores are closely related to the scores from factor scales, except that they are weighted sums (rather than the averaged value of the ratings of items comprising a factor scale). The technique is closely related to factor analysis except that the contribution of an item to a hotspot score is constrained by the MDS map. The number of hotspots is determined by a principle-components analysis of the MOSS data; for each factor from that analysis, the centroid of the locations of the items loading most highly on it provides an initial location for a hotspot in the three-dimensional space. Hotspot locations are then refined iteratively so that through their summary scores they account for as much as possible of the

variance within the data set. Ten hotspots (content areas) were found to be sufficient for the present data set.

Thus the data obtained through the MOSS procedure was reduced to a vector of hotspot scores representing how much or how little each participants' underlying reason for becoming a psychology major was influenced by the psychological meaning associated with each hotspot. These hotspot scores are the primary dependent variables in the analysis of participants' subjective rationale for choosing to major in psychology. The letters in Figure 1 identify the final locations of the 10 hotspots in item space. To assist the reader in understanding the identity/meaning of each of the ten hotspots, the closest items to each hotspots are summarized in Table I.

### 3. Results

It is important to understand the meaning of the map presented in Figure 1 before one proceeds with other data analysis or interpretation. It is difficult to present a three-dimensional object in a two-dimensional journal page. The coordinates of the 72 items have been projected radially onto the surface of a sphere and then these curved surfaces have been flattened to form two hemispheres. One useful way to view this map is to identify the extreme ends of the three primary dimensions and locate these areas on the hemispheres. The center of the left hemisphere represents one pole of the first dimension and the center of the right hemisphere is the other end of this dimension. The left and right edges of *both* hemispheres represent the expanse to the second dimension, and the top and bottom sides of *both* hemispheres the ranges of the third dimension. The concentric circles mark 30, 60, and 90° from the poles of the first dimension, thus making the outer most ring of each hemisphere a sort of "equator" for the entire map.

The left hemisphere in Figure 1 is most closely aligned with "Quantitative Issues" and "Personal Background" items, whereas the right hemisphere is most closely aligned with "Counseling" and "Personality/Individual Differences" items. Specifically note that Personal Background item #59, "psychology is a good major to prepare for other disciplines (such as law school, business)," is the closest item to the center pole at the left and that Counseling item #36, "help children with ADD/ADHD become aware of and modify their behavior", is closest to the center pole at the right. One might conclude that this primary dimension of the three-dimensional space extends from studying psychology as a means to another career goal to that of a means for helping others to cope their own issues, perhaps revealing a self-other focus.

The second major dimension in the solution extends from the left to right edges of both hemispheres. At the left of the two hemispheres lie the

*Table I.* The 10 hotspots and the three items closest to each

Hotspot	Item	
A: Quantitative issues	5.	Focus on methods and techniques for acquiring and analyzing psychological data
	39.	Propose methods for evaluating the quality and fairness of psychological tests
	28.	Develop new methods for performing data analysis
B: Industrial/Organizational	37.	Help organizations with staffing, training and employee development and management
	40.	Apply psychological principles to improve quality of work environment
	70.	Help employees cope with organizational change
C: Personal background	24.	I never received help when younger and I don't want others to experience the same distress
	45.	Parent or relative already a psychologist is a role model
	46.	Have been through and benefited from therapy and now want to help others
D: Understand behavior	20.	Understand why people do the things they do
	19.	To figure out myself, my family, my friends
	3.	The subject matter matches my personal interest
E: School psychology	7.	Understand what motivates students to do well
	2.	Focus on how effective teaching and learning take place
	26.	Learn ways to improve interpersonal and group interactions
F: Sport/performance	8.	Help athletes learn to deal with the anxiety and fear of failure
	76.	Assist athletes with issues of motivation
	72.	Assist collegiate athletes dealing with academic pressures and the expectations
G: Health/rehabilitation	27.	Help people deal with pain management
	14.	Help injured people adapt to their situation
	53.	Work with stroke and accident victims
H: Clinical psychology	57.	Learn means to assess various mental disorders
	67.	Diagnose emotional disturbances
	33.	Treat problems such as phobias or clinical depression



I: Counseling psychology	78.	Assist the victims of child abuse and domestic violence
	63.	Assist people to make positive changes in their lifestyle
	79.	Develop programs to improve parenting skills
J: Personality/individual	61.	Understand how peer rejection of homosexuality affects self-image
	49.	Evaluate personality traits consistent with "the bully" role
	80.	Study why hate crimes are committed

"Industrial/Organizational" and "Sport/Performance" hotspots and items #12 "assist people in dealing with burnout so they can maintain quality performance levels" and #16 "assist athletes to deal with injury, the recovery process and the ability to perform again." Located at the right sides are the "Understand Behavior" items such as #20 "understand why people do the things they do" and #56 "conduct research that helps us understand how people form attitudes toward others." Although both of these items reside in the left hemisphere, they are the items that are furthest to the right when one "collapses" the two hemispheres to focus just on the second dimension. One potential interpretation of this secondary dimension is that it extends from an interest in applied endeavors to those focused on a theoretical understanding of behavior.

The third major dimension in this solution runs from the top to the bottom edges of the two hemispheres. "School Psychology" items such as #2 "focus on how effective teaching and learning take place" populate the top edges and the bottom edges tend to be where the "Clinical" items such as #10 "study how various diseases and injuries of the brain affect emotions, perception, and behavior" reside. The top of the map thus applies to normative and non-normative issues relating to learning and school performance, and the bottom of the map pertains more to issues of mental health.

A repeated measures ANOVA assessed the overall ratings for each of the 10 hotspots (one group of participants/informants, the 10 dependent variables conceptualized as a within subject factor). Significant differences were noted in the ratings students provided for each of the hotspots,  $F(9,569) = 86.16, p < 0.0001, \eta^2 = 0.90$ . Post hoc contrasts revealed that the Industrial/Organization ( $M = -0.21$ ) domain received the lowest ratings from the students, followed by low ratings for the Quantitative Issues ( $M = -0.15$ ), Sport/Performance ( $M = -0.12$ ), and Personal Background ( $M = -0.12$ ) domains. Students gave moderate ratings to the Health/Rehabilitation ( $M = -0.01$ ) and School Psychology domains ( $M = -0.01$ ). Only the Personality/Individual Difference ( $M = 0.09$ ), Clinical

( $M = 0.12$ ), Counseling ( $M = 0.15$ ), and Understand Behavior ( $M = 0.16$ ) hotspots were rated more positively than negatively.

### 3.1. IDENTIFYING CLUSTERS OF INDIVIDUALS

*k*-Means clustering was used to assemble the 165 participants into groups expressing similar reasons for becoming psychology majors. The Pseudo- $T^2$  statistics from the cluster procedure of the SAS package revealed that a seven-cluster solution was optimal (SAS, 1989). The vector of hotspot scores derived for each participant were submitted to a clustering of cases algorithm (program 'km' of the BMDP package; Dixon et al. 1990). Differences amongst these seven clusters were then assessed via a MANOVA and a series of ANOVA procedures (4v package of BMDP). The means, F ratios, effect sizes and Tukey Honest Significant Difference contrasts are summarized in Table II. Notice that between group differences on the 10 univariate (hot spot) measures are assessed by reading along the rows of means, and characterizations of each cluster/group can be obtained by observing high and low values within each of the seven columns.

Chi-square tests of association were conducted to assess the presence of associations between cluster membership and major standing (naïve vs. experienced) and institution attended (UM vs. OU). In the case of major standing, no significant association was detected,  $\chi^2(6, N = 165) = 6.14, p = 0.41$ . Even though naïve majors were not readily found among the Industrial/Organizational cluster, their absence among this group was not sufficient, perhaps given the small sample size, to establish a statistically reliable finding. In the case involving institution attended, a statistically significant association was detected,  $\chi^2(6, N = 165) = 15.08, p = 0.02, \phi = 0.30$ . Students who had an interest in becoming counseling psychologists were more likely to attend OU than UM, and those interested in becoming clinical psychologists were more likely to attend UM than OU.

## 4. Discussion

On March 29, 1976, *The New Yorker* published Saul Steinberg's "A View of the World from Ninth Avenue" on its cover. The drawing shows a bird's-eye view of the world looking west from Manhattan. This whimsical view of the world presents details of a New York City street in the foreground as the scenes beyond fade into ill-defined clumps of condensed space representing the rest of the nation and the world (Salon, 2000). This sketch was never intended to be a rational or realistic portrayal of a New Yorker's view of the world, yet it still captured a "truth" that immediately resonated with many viewers. In a similar fashion, our map of students' view of the reasons why they choose to study psychology presents a highly subjective

Table II. Descriptions of final clusters

Variable	Cluster							F ratio	
	Counseling	Clinical	Personality/ individual	Sport	Generalist	Industrial/ organizational	Community	d.f. = 6, 158	$\eta^2$
Cluster size	37	20	31	15	24	10	28		
Total sample (%)	0.22	0.12	0.19	0.09	0.14	0.06	0.17		
Experience (%)	0.60	0.60	0.71	0.67	0.50	0.90	0.61		
OU (%)	0.78	0.35	0.55	0.47	0.46	0.50	0.39		
Quantitative issues	-0.32 <sup>c</sup>	0.13 <sup>a</sup>	-0.25 <sup>c</sup>	-0.30 <sup>c</sup>	0.03 <sup>a</sup>	0.03 <sup>a</sup>	-0.12 <sup>b</sup>	42.14	0.61
Industrial/organizational	-0.32 <sup>c</sup>	-0.14 <sup>b</sup>	-0.28 <sup>c</sup>	-0.04 <sup>b</sup>	-0.11 <sup>b</sup>	0.29 <sup>a</sup>	-0.40 <sup>d</sup>	46.31	0.62
Personal background	-0.33 <sup>c</sup>	-0.21 <sup>b</sup>	0.02 <sup>a</sup>	-0.18 <sup>b</sup>	0.12 <sup>a</sup>	0.06 <sup>a</sup>	-0.18 <sup>b</sup>	51.84	0.65
Understand behavior	-0.04 <sup>d</sup>	-0.01 <sup>d</sup>	0.20 <sup>ab</sup>	-0.02 <sup>d</sup>	0.28 <sup>a</sup>	0.08 <sup>c</sup>	0.12 <sup>b</sup>	46.58	0.62
School psychology	-0.01 <sup>cd</sup>	-0.15 <sup>c</sup>	0.06 <sup>bc</sup>	0.11 <sup>ab</sup>	0.01 <sup>c</sup>	0.18 <sup>a</sup>	-0.08 <sup>d</sup>	27.73	0.49
Sport/performance	-0.05 <sup>b</sup>	-0.14 <sup>b</sup>	-0.16 <sup>b</sup>	0.23 <sup>a</sup>	-0.29 <sup>c</sup>	0.16 <sup>c</sup>	-0.32 <sup>c</sup>	47.27	0.63
Health/rehabilitation	0.13 <sup>a</sup>	0.09 <sup>a</sup>	-0.09 <sup>bc</sup>	0.09 <sup>a</sup>	-0.19 <sup>d</sup>	-0.12 <sup>c</sup>	-0.02 <sup>b</sup>	41.68	0.60
Clinical psychology	0.22 <sup>a</sup>	0.27 <sup>a</sup>	0.08 <sup>bc</sup>	-0.01 <sup>c</sup>	0.08 <sup>b</sup>	-0.19 <sup>d</sup>	0.31 <sup>a</sup>	48.80	0.64
Counseling psychology	0.30 <sup>a</sup>	-0.02 <sup>c</sup>	0.18 <sup>b</sup>	0.20 <sup>b</sup>	-0.09 <sup>c</sup>	-0.07 <sup>c</sup>	0.15 <sup>b</sup>	55.88	0.67
Personality/individual	0.29 <sup>a</sup>	-0.06 <sup>c</sup>	0.25 <sup>a</sup>	0.08 <sup>b</sup>	0.06 <sup>b</sup>	-0.17 <sup>d</sup>	0.28 <sup>a</sup>	48.30	0.63

MANOVA Statistics: Wilkes Lambda = 0.019; associated  $F(60, 786) = 14.77, p < 0.0001, \eta^2 = 0.91$ .

Notes: 1. All  $F$  ratios are significant at the  $p < 0.0001$  level

2. Row means that share the same superscript do not differ significantly using the Tukey HSD Procedure with  $p = 0.05$ .

account of the world of psychology as students see it. To continue the analogy, the students are as the denizens of New York City; it behooves us to recognize their views if we are to understand them.

#### 4.1. THE MAP

The first objective in this project was to acquire a coherent map of the reasons for majoring in psychology. Students who were near the conclusion of their undergraduate study of psychology provided data with sufficient structure to create a common map, but those who were just beginning their collegiate experience did not. This should not be surprising even though it puts us in a mildly awkward situation akin to “accepting the null hypothesis” if we assert that naïve psychology students do not possess a common conceptualization of the discipline. One interpretation is to note that experienced majors have been taught a common map while naïve majors hold to idiosyncratic perspectives that collectively appear as noise. This suggests faculty might adhere to pedagogy models when teaching introductory courses, and reserve andragogy-based principles of teaching for senior seminars and graduate students. These data support the position of Arnett (2000) in describing college students of these ages as being in “emergent” rather than “early” adulthood if one considers that their understanding of the discipline is still evolving. Still, one should recognize that the map of the experienced majors need not be the exact same map as might be obtained if professors had completed the GOPA, but this is an empirical question for another investigation.

The primary dimension of the map indicates reasons for studying psychology are related to activities collectively known as “helping others”. Faculty who have attended new student orientations will recognize the “I just want to help people” sentiments of the items clustered near the center of the right hemisphere presented in Figure 1. It is probably no accident that the three items closest to this pole refer to children specifically rather than people in general. At the other end of this continuum are items related to rationales that might be conceptualized as outside of the “helping” realm. The focal item at this pole (#59) refers to how psychology can help the individual prepare for a career in another discipline such as law or business.

A more interesting observation is obtained when we stop focusing on the most polar items, and consider the other items associated with the “non-helping” or “outside of psychology” realm. Three hotspots fall within the second concentric ring (the inner 60°) around the pole in the left hemisphere: Quantitative Issues, Industrial/Organizational, and Personal Background. It is difficult to conceptualize the similarities of hotspots when comparing the three items most closely associated with the

essence of each (See Table I). Obviously analyzing data, assessing the fairness of psychological tests, and improving the quality of the workplace are far removed from helping children. The items close to the Personal Background hotspot refer to wanting to help others, but they do so in the way that requires the participant to reveal either that they received therapy or felt that they should have, situations that might be difficult for some respondents. We conclude that the pole to the right represents the essence of helping children while that on the left is something akin to thinking that the south pole is “not-north”. The “not-helping others” pole is much more self-focused.

One wonders why Quantitative Issues are so far removed from the essence of helping others. Perhaps instructors and curriculum designers have not succeeded in making the case that these activities are critical to our discipline. Many psychology curricula include courses in research methodology and statistics as core requirements, but apparently, students do not perceive these courses to be central to their interest in psychology but indeed to be far removed from their interest in the discipline. This creates a dilemma for the instructors teaching and the faculty requiring these courses that is too great to dismiss with a shrug and a comment that student distaste of statistics is old news. If quantitative methods are truly integral to psychology, majors then one might expect this hotspot would be closer to “helping children” items than to “I want to go to law school” items.

The second dimension of the map indicates students differentiate between situations with a goal of understanding people and their behavior and those with a goal defined with reference to obtaining or maintaining high levels of performance. With respect to the hotspots this dimension extends from “Understand Behavior” to that of “Sport/Performance.” Note that “Understand Behavior” lies within the “un-helping” region of the first dimension and is associated with items that are perhaps indicative of less-sophisticated rationales for studying psychology rather than with issues of theory. “Sport/Performance” lies in the “helping” hemisphere, but it is very close to the equator, thus indicating that interventions with athletes or people suffering from burnout is quite removed from “helping children.”

Finally, the third dimension of the map indicates students distinguish between applications of psychology they experience daily (e.g., effective teaching, learning, and motivation for learning) and those that are more esoteric (e.g., diseases and injuries to the brain). The space defined in this three-dimensional map defines the structure students employ, though perhaps subconsciously, to organize psychology. It is not necessary to define dimensions with respect to polar opposites any more than it is necessary to conceptualize east as being the opposite of west. The map provides an empirically derived representation of how psychology students

conceptualize the discipline and the relationships of various components of the discipline. The question of which niche within the map different students seek was the next objective of this project.

#### 4.2. HOTSPOT SCORES

If we continue the metaphor of a map, one can define places with reference to latitude and longitude. These values will clarify whether someone lives on the east or west coast of the US, or the north or south islands of New Zealand, but latitude and longitude alone will never distinguish the psychological distinctiveness of these locales. To accomplish, this we need to consider the increased information provided by a vector or profile of hotspot scores.

High positive scores on a hotspot are conceptualized as representing a strong interest in that domain, and a large negative score represents a lack of interest. A low overall rating for Industrial/Organizational issues may simply indicate that many students focus their interests in psychology in other areas, or that they do not know that psychology is routinely applied in the business sector. A low overall rating for Quantitative Issues cannot be so easily ignored. Faculty and graduate admissions committees view topics such as statistics and research design to be among the core of the basic psychology curriculum. Indeed, Norcross and his associates surveyed over 1,500 graduate programs in psychology and found statistics was required or preferred by 85% of the programs (Norcross et al., 1996). Norcross and his associates deemed these figures to be underestimates of the true values because this sample did not include graduate programs that required a psychology major. Indeed, in an earlier assessment Mayne et al. (1994) found 94% of all APA approved graduate clinical programs required a course in statistics.

Most students expressed a strong lack of interest in Quantitative Issues. Unless this bias is resolved in graduate studies, one can presume that these students will have limited opportunities to establish successful careers in psychology. Psychology faculty may need to consider alternative ways to clarify and emphasize the importance of quantitative courses. Indeed, it may be prudent to identify the interests and expectations of the potential psychology major within the first year of baccalaureate study so that an early correction of misconceptions such as the low interest in quantitative courses might be possible.

#### 4.3. BETWEEN CLUSTER COMPARISONS

The *k*-means clustering analysis indicated that respondent rationales for being a psychology major could be heuristically partitioned into seven

groups. Although class standing did not distinguish these groups, it was evident that the Industrial/Organizational subgroup was comprised primarily of experienced majors (only one novice among the 10 students). The rarity of a naïve psychology major showing a keen interest in the Industrial/Organizational niche is not surprising when one considers that the desire to help others is more likely to connote images of assisting children to cope with ADHD (item #36) than to assist employers and employees in dealing with burnout and productivity (item #12) or athletes with issues of motivation (item #76). One might also notice in Figure 1 that item #36 has far more “neighbors” than do items #12 and 76, suggesting that the concept of “helping others” is primarily associated with children and parents.

The seven groups derived through the clustering algorithm provide an interesting way to conceptualize individual differences among psychology majors. The largest of these groups ( $n=37$ ), labeled Counseling, was composed primarily (78%) to students from the regional institution. These students expressed strong interest in Counseling and Clinical psychology and in issues of Personality/Individual Differences. This group also expressed low interest in Quantitative Issues, perhaps revealing that the desire to avoid mathematics (see item #4 in Appendix A) influenced their interest in psychology. A smaller group of students ( $n=20$ ), labeled Clinical, was composed primarily (65%) of students from the larger research-based institution. This group expressed an interest in Clinical but not in Counseling psychology. Moreover, this group had the highest score observed for Quantitative Issues. The members of both of these groups apparently are interested in assisting others with issues of mental health and adjustment, but the Clinical group diverges from the Counseling by their recognition that the practice of psychology requires a sound foundation in understanding quantitative methods. The clinically oriented students at UM-Ann Arbor have greater opportunity to see faculty and graduate students engaged in empirical research of clinical issues. Indeed, students at OU might well characterize their clinical faculty by the fact that they maintain private practices off campus rather than by their research productivity.

Three other groups express an interest in the professional practice of psychology. The largest of these groups ( $n=28$ ) has been labeled Community due to their interest in issues related to Clinical and Personality/Individual Differences. This group presented a score for Quantitative Issues that was midway between the high score of the Clinical group and the low score of the Counseling group. The low scores provided by members of this group on the Industrial/Organization and Sport/Performance domains suggest that these students have identified a particular area to concentrate their interest in directly providing psychological services to others.

The other two groups with interest in the professional practice of psychology were the two smallest groups observed. One group, labeled Indus-

trial/Organizational, was composed largely of experienced majors (90%) who expressed a strong interest in Industrial/Organizational, Sport/Performance, and School psychology issues. This group also expressed a positive interest in Quantitative Issues. The second group, labeled Sport, also primarily drawn from the senior psychology majors (67%) who focused on Sport/Performance or School psychology issues but not on Industrial/Organization psychology.

The last two groups collectively account for one third of all psychology majors assessed, but each possess distinctive traits. The first, labeled Personality/Individual, revealed a strong interest in issues of Personality/Individual Differences and very high scores in the Personal Background and Understand Behavior domains. They expressed very little interest in the Quantitative Issues domain. One might suggest that this group is seeking understanding of and solutions for personal background issues, i.e., that they are seeking help for themselves and their own issues more than wanting to learn how to help others.

The last of the seven groups has been labeled Generalists. This group presented high scores in Personal Background, Understanding Behavior, and very low scores in the service-delivery domains such as Sport/Performance, Health/Rehabilitation, and Industrial/Organizational. This group appears to be most interested in understanding behavior without any concerns of applying this knowledge.

The detection of these seven groups indicates that strong differences exist among students with respect to their reasons for becoming psychology majors. Reductionistic thinking may lead some readers to the conclusion that faculty teaching undergraduate students have long known these differences. Indeed, knowing that psychology majors want to help people, dislike statistics, and want to understand themselves and others is not news. The data presented here reveal how stereotypic such assumptions are. Many students are clearly interested in service-delivery or practitioner occupations, and most have focused their interest on a particular domain for potential practice. Students do not simply dislike quantitative courses, they do not perceive these courses to be part of the discipline. Personal backgrounds and personal interests clearly influence some students a great deal, while others apparently are less affected by these issues.

#### 4.4. THE QUESTION OF TRACKS OF STUDY WITHIN THE DISCIPLINE

One interpretation of the cluster results might lead some to consider establishing tracks of study through the curriculum. Faculty might consider whether the development of curricular tracks would be useful to enhance the learning process of students who identify their interests as residing in Counseling, Clinical, Personality/Individual Differences, Sport/Performance, Industrial/Organizational and Community Psychology. This is not to sug-



gest that undue specialization at the undergraduate level is desired, but instead to propose that the relevance of course material might be more obvious if its presentation were customized for specific audiences based on their expressed interest in the discipline. Indeed, a case against premature tracking is readily made by noting that it unnecessarily segregates students and could create problems if students change their interests and shift tracks.

If faculty knew that student interests could be distinguished as in the seven clusters identified above, then one would assume they could utilize this information to tailor presentations to match the needs and expectations of the students. Homework problems in statistics classes could be tied to interest in Industrial/Organizational, Clinical, or Counseling applications in an effort to illustrate the application of these skills/tools in these domains. Likewise, instructors of tests and measurement courses could employ illustrations that tie directly to the interests of the students to demonstrate that the skills and knowledge taught in this course are pertinent to numerous applied settings. For example, abstract discussions of concepts such as reliability or validity could be revised such that the concepts were approached in the context of how one measures depression or ADHD in a real-world setting. Although faculty may see the commonality of statistics and research methods in Industrial/Organizational, Clinical and Counseling applications, students may be more concrete in their understanding of these areas and in need of more assistance in learning that assessments of employees and mental health clients are often required. Four clusters of students (Counseling, Personality/Individual Differences, Sport/Performance, and Community) appear to be at high risk due to their very low interest in Quantitative Issues, as the knowledge and skills obtained in courses of quantitative methods are critical to careers in these areas. The Clinical and Industrial/Organizational clusters at least show a positive interest in Quantitative Issues, though one that is considerably lower than the other interest scores obtained.

Alternatively, one should recognize that these group profiles represent the students' collective subjectivity regarding psychology as a discipline. Perhaps the message for faculty is in knowing "where their students are coming from." Although many students come to a psychology department professing an interest in what they perceive to be clinical issues, this cluster is actually smaller than both the Counseling and Community groups. Perhaps students experience some confusion regarding the differences between these three areas of psychology that the faculty might address more thoroughly in the curriculum (cf., Mayne et al., 2000.)

The items closest to the Personality/Individual Differences hotspot include references to numerous subdivisions within psychology (e.g., Developmental, Cognitive, and Social). All of these items share the characteristics

of being focused on understanding specific issues, and not of being focused on applications or service delivery. Therefore, the Personality/Individual Differences cluster might be conceptualized as containing students who are interested in a vast array of research topics. It is interesting to note that the students' subjective understanding of the discipline contains specificity with respect to where psychology is applied (e.g., Clinical, Industrial/Organizational, Counseling, or Community) but lacks distinction between content domains such as Developmental, Social, or Cognitive. Students apparently grouped these items simply as distinct from the applied aspects of the discipline. Perhaps the students' view of psychology is to see a distinction between practitioners and researchers rather than between practitioners, applied researchers, and basic researchers, or even types of researchers. Faculty in areas such as Developmental, Social or Cognitive Psychology are advised to assist students in understanding that researchers in these areas are creating the knowledge that is used by the various practitioners working with a diverse array of constituents.

The very high scores on Understand Behavior domain of the Generalist Group may reflect a broad but superficial approach to the discipline or a concerted effort to truly become a jack-of-all-trades. The latter may be in an excellent orientation if one's goal is to become a secondary education teacher of psychology. It seems logical to assume some non-traditional students who are returning to colleges and majoring in psychology may be doing so with a goal of personal enrichment rather than career development. Faculty should seek additional information to understand more thoroughly the motivations for members of this cluster to ensure that the learning objectives in the courses match the needs of their students.

## **5. Conclusions**

The data presented here reveal the subjective appraisals of naïve and experienced majors concerning psychology as a discipline and their reasons for selecting this course of study. We have no doubt that graduate students or faculty would provide somewhat different maps of psychology if they were to serve as card sorters in the first phase (GOPA) of the data collection described above. It does not appear useful to address the distinctions between the model of neophyte students and that of seasoned faculty members in terms of who is correct and who is incorrect. Indeed, the task for faculty members should be to understand the conceptualizations of the neophytes and set a course to move these students to obtain new understandings of the discipline. Knowing where your students are on their own journeys, or how they now think about the discipline, is a useful starting place in determining the course that might be set.

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### Notes

1. Given a set of locations in a two- or three-dimensional space (e.g., 10 major US cities on a map), it is straightforward to calculate the matrix of distances between them. The reverse computation – reconstructing a map from information about inter-point distances – is harder but not impossible, and is the province of Multidimensional scaling (MDS).

The key assumption to accept before undertaking MDS analysis is that the items of interest can be represented as points in a low-dimensional space; a “semantic space” when the items are concepts or words – less concrete than the geographical space of the map of North America. The key pre-requisite for MDS is a matrix (or matrices) of inter-item similarities or dissimilarities, associated in some way with inter-point distances. The matrix could consist of correlations among items, for instance, if they have received numerical values from a number of subjects, in which case MDS is clearly an alternative to factor analysis. In the geographical example, it could contain road distances, or travel times, or air fares between the 10 cities.

But any kind of distance or similarity matrix can be analyzed. People’s ratings of similarities between objects can be converted to a similarity matrix, and MDS methods will allow the researcher to ask relatively unobtrusive questions (“how similar is A to brand B”) and to derive underlying dimensions from those questions without leading respondents astray by letting them know the researcher’s real interest.

A map of the US (from the Atlas, or reconstructed by MDS) will conventionally feature the two geographical dimensions of North–South and East–West. Given a MDS solution – a “map” with two dimensions, or three, or however many the analyst has chosen – each dimension is a way in which “objects” can vary, a distinct ‘mode of difference’ among them, as well as a scale providing a coordinate to locate each object. However, we can rotate the map of US cities and the distances between them would remain the same; we can swap North and South, or East and West. Just as in factor analysis, the orientation of axes in the final solution is arbitrary, and the researcher is free to choose whichever orientation is most useful in explaining the phenomenon at hand.

If the observed dissimilarity data contained no noise (so that they reflected distances in the hypothetical space perfectly), the dimensionality of that space would be easily obtained. A MDS solution with too many dimensions would do no better at accounting for the observations than one with the correct number of dimensions. A solution with too few dimensions, however, would leave some of the data unexplained. Real-world data contain noise, of course, introducing an element of subjectivity when one decides how many dimensions to accept; rules-of-thumb exist, but they are sanctioned more by tradition than by theoretical rigor or empirical support.

The MDS thus is a way to arrange objects in an efficient manner to provide a configuration that best approximates the observed distances. It actually moves objects around in the space defined by the requested number of dimensions, and checks how well the distances between objects are reproduced by the new configuration. Imagine that wooden sticks of various lengths connect Styrofoam ball representing each of the 10 cities to the

other nine cities. The task for MDS is to arrange these balls (points in two-dimensional space) without whittling from or adding to the given length of the sticks. Specifically, MDS uses a function minimization algorithm that evaluates different configurations with the goal of maximizing the goodness-of-fit (or minimizing “lack of fit”).

## **Appendix A**

### **Items Used in Card Sort Procedures**

1. Discover how people can work better with machines (technology).
2. Focus on how effective teaching and learning take place.
3. The subject matter matches my personal interest.
4. I wanted to avoid math.
5. Focus on methods and techniques for acquiring and analyzing psychological data.
6. People tell me that I have a gift for helping others.
7. Understand what motivates students to do well.
8. Help athletes learn to deal with the anxiety and fear of failure.
9. Assist performers to coping with pressure from teachers, parents, or coaches.
10. Study how various diseases and injuries of the brain affect emotion, perception, and behavior.
12. Assist people in dealing with burnout so they can maintain quality performance levels.
13. Study how a person's life is shaped by interactions with other people.
14. Help injured people adapt to their situation.
16. Assist athletes to deal with injury, the recovery process, and the ability to perform again.
17. My Introductory Psychology teacher turned me on to this subject.
18. I was not accepted into my first choice program.
19. To figure out myself, my family, my friends.
20. Understand why people do the things they do.
21. Assist people to cope with a sense of failure.
22. Identify common predictors of antisocial behavior.
23. Study the way the brain creates and stores memories.
24. I never received help when younger and I don't want others to experience the same distress.
25. Study how people develop across the life-span.
26. Learn ways to improve interpersonal and group interactions.
27. Help people deal with pain management.
28. Develop new methods for performing data analysis.
29. Study the effects of spirituality on behavior.
30. Study the influences of race, ethnicity, and culture on student learning.
31. Explore the relationships between brain systems and behavior.

32. Suggest ways to change harmful attitudes (as in the case of prejudice).
33. Treat problems such as phobias or clinical depression.
34. Research and develop ways to provide quality of life for elderly people.
35. Study how divorce affects future intimate relationships for children.
36. Help children with ADD/ADHD become aware of and modify their behavior.
37. Help organizations with staffing, training, and employee development and management.
38. Support people in coming to terms with the death of loved one.
39. Propose methods for evaluating the quality and fairness of psychological tests.
40. Apply psychological principles to improve quality of work environment.
41. Develop health care strategies that foster emotional and physical well-being.
42. Study how early physical development affects a child's peer relationships.
43. Find out how technology can be designed to increase performance.
44. Study the reasons people use food as a coping mechanism.
45. Parent or relative already a psychologist is a role model.
46. Have been through and benefited from therapy and now want to help others.
49. Evaluate personality traits consistent with "the bully" role.
50. Work with people who have cognitive disabilities.
53. Work with stroke and accident victims.
54. Assist people facing social pressures of living in interfaith families (ex. Catholic/Jewish).
55. Learn about the various kinds of psychological treatments that are available.
56. Conduct research that helps us understand how people form attitudes toward others.
57. Learn means to assess various mental disorders.
58. Create research strategies to assess the effectiveness of psychological treatments.
59. Psychology is a good major to prepare for other disciplines (such as law school and business).
61. Understand how peer rejection of homosexuality affects self-image.
62. Assist children to realize their potential.
63. Assist people to make positive changes in their lifestyle.
64. Assess how chronic illnesses can be incorporated into everyday life.
65. Interest in how various factors affect health and illness.
67. Diagnose emotional disturbances.

68. Conduct behavioral intervention when appropriate to resolve school-related issues.
69. Help people in substance abuse programs.
70. Help employees cope with organizational change.
71. Develop strategies to overcome procrastination.
72. Assist collegiate athletes dealing with academic pressures and expectations.
74. Assist members of social groups in dealing with competition within the group.
75. Help people to deal with the anger of contracting STDs.
76. Assist athletes with issues of motivation.
77. Help people cope with personal problems that interfere with performances (job, school, and athletic).
78. Assist the victims of child abuse and domestic violence.
79. Develop programs to improve parenting skills.
80. Study why hate crimes are committed.
81. Understand the causes of and means to prevent suicide.

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