A S C A P N E W S L E T T E R

Across-Species Comparisons And Psychiatry Newsletter
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> A new scientific truth does not triumph by convincing its opponents but rather because its opponents die, and a new generation grows up that is familiar with it. Max Planck

(c/o Rassell Gardner, 1.200 Graves Building (D29), University of Texas Medical Branch, Galveston, TX 77550)

For the philosophy guiding this newsletter, see footnote on p. 6(1). Newsletter aims: 1. A free exchange of letters, notes, articles, essays or ideas in whatever brief format.
2. Elaboration of others' ideas.
3. Keeping up with productions, events, and other news.
4. Proposals for new initiatives, joint research endeavors, etc.

Announcement: As many of you know already, the UMich Evolution and Human Behavior program has announced a meeting in Ann Arbor on "Evolution, Psychology and Psychiatry" for Oct 28-30, 1988, to facilitate exchange of ideas and findings among resarchers, emphasizing an emerging new basic science; and to consider plans for an organization that would promote research and scholarly exchange. For information, contact Randolph Nesse, M.D., University of Michigan Medical Center, Med Inn Bldg Room C440, Ann Arbor, MI 48109-0840.

Notes: This issue features contrasting essays: the first describes CH, a psychiatric patient whose management included considerations of R [1b; ASCAP #7 and other previous issues]; the second presents a computer simulation of how a creature with a few sensory and cognitive capacities on the one hand and a simply varying environment on the other hand, tries to enhance R via food. In contrast to usual ASCAP concerns, no "intraspecific communication" occurs (each variant of the "animal" does its run by itself). But we hope that this simple linear mathematical model (constructed by a mathematician) can in turn become a model for deploying linear (or non-linear - see next issue) similar models for situations as when inter-creature communication takes place, so that interactive effects on each individual's R may then be explored.

More R for CH: A Case RGardner

CH, a 25 y.o. woman, was admitted to the 5S unit of Mary Moody Northen Pavillion of UTMB for a second suicide gesture in a 2-week period. In her past was an 8-year history of repeated encounters with the psychiatric system including a "psychotic" period of 3 days which she told about in fond dramatic detail: she visually hallucinated (seemingly related to illicit drug use). Observed in a group, she impressed us with other vivid stories of having worked in two restaurants, enjoying it much until power struggles got her fired.

Her hospital records from another setting within the past year revealed their, and her, impression that she was chronically schizophrenic (her chief complaint at that hospital). 5S is a research ward and part of the routine for research subjects (ie, defined as such because she agreed to sign consent forms and give blood samples) is that very careful diagnostic assessments take place. She did not have schizophrenia according to these assessments but rather a borderline personality disorder.

In the hopes of helping her through raising her R, we conveyed to her the intended anathetic message that she did not possess the major mental illness of schizophrenia, that we felt that she could profit from psychotherapy provided that she seek it out herself and make it her own, and that she did not need the psychotropic drugs that she had been taking upon admission. We stated that we were impressed with her initiative at the restaurants and that psychotherapy might help her cope with her repetitive power struggles.

Later that she showed that she was unhappy with these statements (she experienced them catathetically rather than anathetically as intended -of JPrice's comments about McLean's work with couples, ASCAP #6.) That is, CH felt she "deserved more" as she was a chronic patient. She sulked and said to a nurse on the afternoon shift, "They think that there's nothing wrong with me!"

A psychotic fellow patient had a birthday and later that day, his devoted parents brought him a cake which they generously (anathetically) offered to the other patients. One of the nurses noticed that when staff attention diverted from her, CH had cut for herself a large piece amountiny to 1/4th of the cake. When the nurse suggested that CH should have asked permission, CH dramatically took the piece and smashed it on the entire cake, ruining it and casting a blight on the party (catathetic signal intended to reduce others' R?!)

Our treatment team's approach in discussing the incident with her on rounds the following morning (at which time she flatly stated that nurse had lied about the cake incident) was to utilize an approach tailored to patients with self esteem problems (ie, are narcissistically damaged) that involved ignoring the catathetic import of patient communications with responses of anathetic intent instead, with interim checks to determine effect. That is, we followed a principle that the treatment team has the capacity to enhance relative R of persons uncertain of their R; the clinical question is how to accomplish this efficaciously. She, we surmized, had felt — had estimated -- a more secure absolute R when she secured a "career" as a patient.

We discussed with her that indeed we did not intend saying there was "nothing wrong" with her; rather, having the diagnosis of a borderline personality disorder indeed indicated problems of major proportions. We reviewed with her criteria from DSM-IIIR for this disorder (rephrasing them in non-perjorative terms) and suggested that struggling with problems of "emptiness" and "boredom" (words she had used) were in fact major problems. We alluded also to her problems with authority (which she freely recognized) as major handicaps with which she had to struggle. We admired the care with which she groomed herself that morning and the pride she obviously took in her appearance.

These (and other anathetic aspects of the ward atmosphere) seemed to have salutory effects: Various family and living situation problems seemed to evaporate and she departed for home sooner thereafter than we had thought possible.

Comment: In ASCAP #6, John Price discussed Peter McLean's work in which couples disagreed; remarks meant anathetically were experienced catathetically. The above case and much other experience with character disordered patients illustrates the prevalence of such misunderstandings in the communications of everyday life. Of course, clinicians do things every day similar to what our treatment team did. We are simply calling it something (like Moliere's character speaking "prose")

But calling something something may be necessary to call attention to it as a feature deserving of interest as well as getting a handle on how to model it. Speaking of models, let's go on to that of H Slotnick's "mouse" seeking to increase its R with food:

Estimating Importance of Sensory Input and Cognition in Goal Directed Behavior by HB Slotnick, UNDSOM, Grand Forks, ND (this is a condensed version of a longer otherwise unpublished manuscript.)

The project's immediate goal was development of a computer simulated goal-directed behavior, ie, behavior i) motivated by some need, ii) evidenced by some activity, eg, movement or reasoning done in anticipation of movement) attempting to satisfy the need, and iii) terminated when the need is resolved or the system can no longer function.

Programming for the simulation (here called a mouse) was done in ProFORTRAN on an IBM PC/XT with an 8087 math coprocessor.

All the subject mice both sensed (used vision and olfaction) and thought (displayed memory and logic). Vision meant ability to detect a landmark when both the landmark and mouse represented endpoints of a straight line segment. Olfaction meant sensing of food in that i) both food and mouse could be connected by an unbroken line, and ii) intensity of "aroma" diminished with the square of the distance from the food. Memory meant the mouse knew and maintained the diagram of its cage and logic meant the mouse could use this diagram to plan routes. "Parameter control" existed for vision, olfaction and memory (ie, maximum distance perceptible and maximum premises remembered were pre-set for all of the mice.)

Use of logic meant each mouse deployed a series of propositions relating landmarks, ie, places in the cage where barriers changed direction (such as corners) to one another through the use of vision. If landmark A was visible from landmark B, the proposition

See,(A,B)

related the operands A and B to one another through the operator "see." Absence of barriers between A and B meant that if a mouse could see a landmark, it could get to it.

Each mouse used these propositions to plan cage routes; thus, if it saw landmark A from its current location, if landmark B could be seen from A, and if the food can be seen from B, the mouse could plan the route by reasoning

See,(B,Food)
See,(A,B)
A

therefore Food

which is to say if a mouse can get to A, it can get to B, and it can then get to food. There were no limits on the number of controlled propositions each mouse could string together to plan a route.

The experiment requested each mouse to find the food placed in its cage. Independent variables included each mouse's vision (max=18 cells), olfaction (couldn't smell more than 10 cells away) and memory (percentage of relations the mouse was allowed to retain: percentage and relations actually retained were random values).

Also independently varying were 6 different cages containing 2, 3 or 4 lanes with an internal lane variation for each through the cage's center. The internal lane meant there were places where the mouse could see practically the whole cage. The 6 cages, then, included internal and no internal lane variations on 2-lane, 3-lane and 4-lane cages.

Cages were all 20x20 matrices with internal dimensions of 18x18 for freedom of movement since the outer ring of cells were walls. Within-

cage barriers were constructed by identifying barrier cells. A barrier, eg, from top to bottom might involve cells designated

Cell 4(r,10)

where r identifies rows 2,3,4,..,19 (omitting cells in rows 1 and 20 which are already external barriers).

First order interactions among the 5 independent variables were examined but not those of higher order, as these would probably contribute little to the explanatory power of the equation.

Mouse and food location were randomly placed for each trial and all 5 independent variables were assigned random values. Trial outcomes were success or failure at finding food. Based on this information, a linear model related sensory input and memory to outcome in the presence of variables describing the cage.

A first run indicated 250 different mice must be run for the 100-150 observations necessary to estimate the contributions of the 5 independent variables and first order interactions.

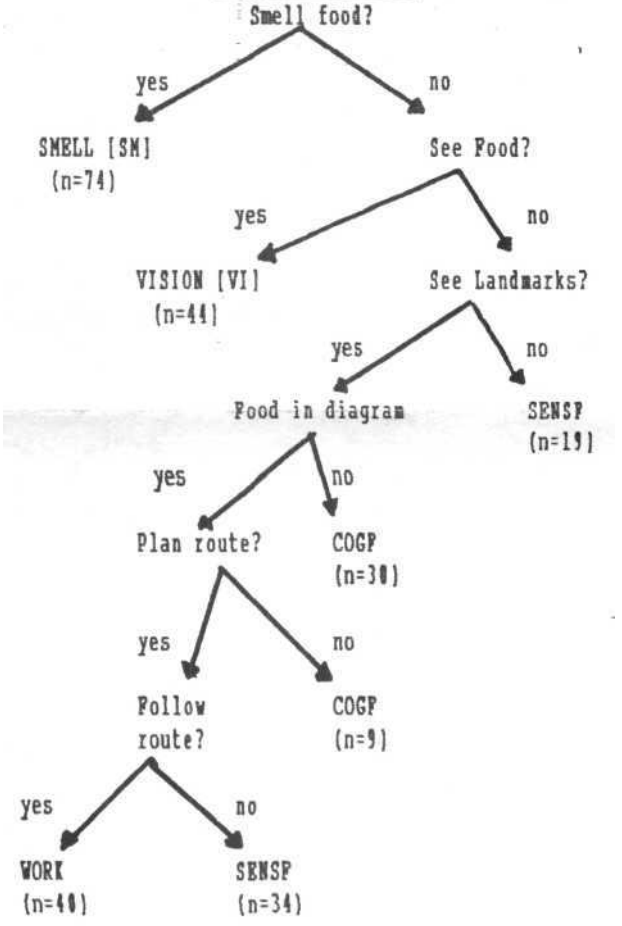
The analytic strategy included four parts: i) 250 runs, ii) classification of results, III) comparing whether abilities were congruent with results, and iv) building a linear model of outcome (not included here for space reasons.)

For ii, subdivisions were into 5 categories: [SMELL] success due to olfaction (vision and cognition weren't needed), [VISION] success due to vision (cognition wasn't needed), [WORK] success when all three were needed, [COGF] cognitive failure because the mouse either did not have a proposition in its plan involving the food or the propositions were insufficient to plan a route to the food, and [SENSF] sensory failure because the mouse's sensory abilities were insufficient to detect either a landmark or the food when entering the cage, or a landmark or the food along the route identified. Here the mouse "knew" where it wanted to go, but could not see the next landmark on the route.

In iii, comparisons of trials with abilities, increased abilities predicted increased success of mice with more acute senses or better memory, ie, VISION trials should happen with mice with the best vision, while SENSF mice should have poor vision.

Results of 250 trials indicated that on 74 occasions, smell determined food success [SMELL] and on 44 more, vision did [VISION]. Eliminating these categories of result, 132 trials required both sensory inut and cognitive functioning; 40 of these showed mouse's success of finding the food: success rate=30.3% [WORK].

Figure 1. Outcomes



In comparing the 5 categories of trial, successes and failures were clearly attributable to vision, olfaction and memory as expected.

Differences among the 5 groups were sufficiently strong that discriminant analysis results could be used to classify accurately about half to 3/4ths of the trials in each of the groups except WORK, the group requiring both memory and vision for success. Here about a third were classified correctly and almost half (19/40) wound up classified as SMELL.

Examination of how vision, olfaction, memory and variables describing cage (no. of lanes and $\pm$ internal lane) showed that the 5 measures were orthogonal to each other, and when considered individually, only vision and memory contributed significantly to outcome. Indeed, these 2 measures also contributed to all interaction terms correlating significantly with outcome. Stepwise multiple regression showed these 2 measures appeared in the final equation predicting outcome. Terms in this equation included memory and the vision-by-memory interaction (VxM). That is, memory and VxM were the only predictors. Overall results of this analysis indicated a multiple R =.69, (similar, incidently, to the prediction of human academic performance from past measures of ability).

That the mouse found the food 118 times simply with olfaction or vision may reflect that the cages were "easy" - few lanes, and random procedures. However, all cages appeared homogeneous in level of difficulty; no. of lanes and presence of the internal lane conferred no advantage.

Vision clearly distinguished between two successful groups (VISION and WORK) and probably distinguishes a subset of mice in the other successful group (SMELL). Vision seemed to be responsible for success in this simulation and failure of vision for failure. This claim cannot be made for memory, since it was not possible for a mouse to succeed solely on the basis of memory. While it was possible for a mouse to succeed on the basis of olfaction, it could overcome a smell failure by utilizing vision. The converse was not true because a mouse could not sense a non-food landmark through olfaction.

As noted, a mouse could not succeed with memory alone. The discriminant analysis results demonstrated for this reason that memory ability separated the failure group (COGF) from all others with a difference in mean scores in discriminant space between this and the other groups of about 1 standard deviation. This distance occurred whether the other groups were successful or failed to get food. That is, success seemed to be independent of how much memory the mice in question had, but while memory did not predispose towards success, its absence predisposed towards failure. When memory was sufficient, sensory limitations had been pivotal. This means that when memory was sufficient, sensory limitations became pivotal.

Of the three attributes of the mouse, olfaction was least important. While it accounted for differences among groups, there was sufficient overlap in discriminant space so that its usefulness was limited in this regard.

When rate of success at finding food is held constant, the relative importance of vision and memory varies. If the mouse has an almost complete cognitive map, a large loss of memory can be overcome by a small increase in vision, and conversely.

For those desiring to enhance R with old issues, let us know which ones.

ASCAP #9 (August 15) will feature an excerpt from the Introduction of a manuscript by Herbert Weiner and Emeran Meyer entitled: The Organism in Health and Disease: Towards an Integrated Biomedical Model.

ASCAP #10 (September 15) will present the factor analytic results of a scale to measure psychopathy in normal, prison and psychiatric patient populations in the USA and India, as these have bearing on the concept of alpha psalic [1c].

1. Philosophy and goal: High scientific importance rests on comparing animal behaviors across-species to understand better human behavior, knowing as we do so that evolutionary factors lust be considered for understanding properly such behaviors. To accomplish these comparisons, very different new ways of viewing psychological and behavioral phenomena are required. This in turn explains why we need new words to define and illustrate new dimensions of comparisons across species. We expect that work in natural history biology combined with cellular-molecular biologic research will emerge as a comprehensive biologic basic science of psychiatry. Indeed, this most happen if we are to explain psychiatric illnesses as deviations from normal processes, something not possible now. Compare to pathogenesis in diseases of internal medicine.

Some neologisms that hopefully will help implement these goals are those of:

a) Michael R. A. Chance: "hedonic" and "agonic" refer to the tone of groupings of conspecifics (members of a same species) i.e., relaxed and fun-loving versus tense and competitive. First initiated with CJ Jolly in 1970, this term is referenced fully in ASCAP #1, Footnote 1.

b) John S. Price: "anathetic" and "catathetic" describe conspecific communications. Catathetic messages "put-down' whereas anathetic signals "build-up" the resource holding potential (R) of target individuals,

c) Russell Gardner, Jr.: "psalic" is a 2 way acronym: Propensity States Antedating Language in Communication and Programmed Spacings And Linkages In Conspecifics. This describes communicational states conjecturely seen with psychiatric disorder and normality (human and non-human), ie, alpha psalic seen in manics, high profile leaders and dominant non-human animals. Eight psalics are named alpha (A), alpha-reciprocal (AR), in-group omega (IGO), out-group omega (0G0), spacing (Sp), sexual (S), nurturant (N), and norturant-recipient (HR).

All of the above new or renewed terms are initiated or elaborated in Chance, MBA (Ed) Social Fabrics of the Hind, due out in 1981, published by Lawrence Erlbaum Associates, Hove and Hew York.