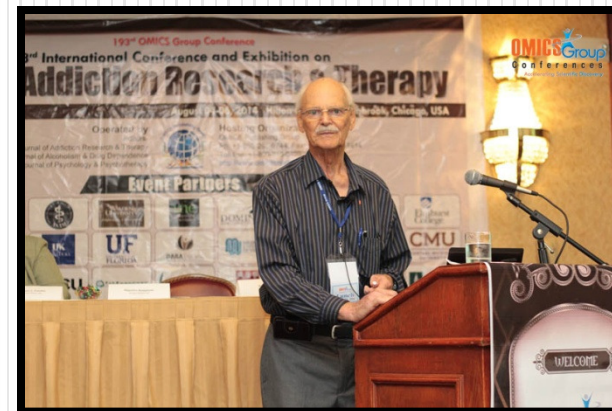# Addiction Therapy-2014

Chicago, USA
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Toward Developing a Comprehensive Theory of Behavior

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Rationale for a Path to Develop a General Theory of Behavior

- Current status of broad theories of behavior

- Need to develop theory to help unify disparate areas of psychological knowledge

- Current attempts at unifying theory have flaws

Silos of Psychology Knowledge, Phenomena, Lawful Relationship and Micro-Theories

Abnormal-Clinical
- Depression
- Aggression
- Cognitive distortion
- Etc.

Personality
- Pers. Traits
- Pers. States
- Theory of Personality
- Etc.

Social
- Group functions
- Decision Making
- Group by Pers. Stereo typing
- Etc.

Assessment
- IQ
- DSM DX
- Memory
- Neuropsy. Functions
- Etc.

Cog-Beh. Therapy
- Etc.
- Depression
- Cog. Distortion
- Prevention
- PTSD th. & Trx

Silos of Psychology Knowledge (1)

Abnormal / Clinical

Personality Theory

Social Psychology

Psychology Assessment

Cognitive Behavioral Therapy

The Path Proposes:

- Deduction of principles across domains of existing psychological knowledge and theory development.

- This process is elegantly argued for, and described succinctly by E.O. Wilson (1998). It is

- Consilience by synthesis, thus predictive synthesis.

Consilience

- Wilson's (1998) makes a compelling argument for a paradigm shift for conceptualization across all areas of human knowledge including behavioral science.

- Every area of human knowledge may be organized by a small number of natural laws that encompass principles applicable to all areas of human learning. This intellectual quest he calls consilience.

- It is in the spirit of consilience and concern for a path to unifying knowledge across psychology and behavioral science, that this path toward a unified general theory of behavior is offered.

First Flaws in Mowrer's Theoretical System (1960)

- Does not specify when or how behavior is initiated

- Does not explain a mechanism for evolution of free-flowing behavioral output

- **<u>However</u>**, Mowrer's theory is accepted and assumed to be subsumed, in all its details of conditioning & learning, within the current proposed path.

- Proposed modifications may correct the flaws

Mowrer's Theoretical System (1960a: 1960b) and proposed modifications

Second Flaw: No effort to articulate with quantifiable theories

1. Formal Axioms and Postulates to address the flaws

2. First efforts to specify equations which may improve predictive precision of the modified general theory system

Flaws in Staats (1997) Theoretical System

- Does not define goal directed behavior as a key explanatory concept

- Provide insufficient mechanisms to assess and specify the key explanatory variable: Basic Behavioral Repertoire

No effort to articulate with quantifiable theories

Flaws in West's (2007) Theoretical System

- Specification lacking for how momentary motivation changes affect behavior

- No effort to quantify explanatory variables

- No effort to articulate with quantifiable theories

Flaws in Current Theories that New Path to Theory is Designed to Address

- No specification of starting and endpoint for explained behavior

- No accepted specification of the behavior to be explained, i.e. goal directed behavior

- No logically compelling (mathematical) articulation with other credible mini- theories, especially quantified theories that are well grounded in supportive programs of research

Path to Theory utilizes and builds on theoretical concepts of Mowrer and Staats (1996)

- Path to theory specifies new variables

- Path to theory attempts quantification

- Path to theory subsumes Maslow's Hierarchy of Human Needs as the structure of reinforcement that initiates and sustains human behavior

Path to Theory subsumes Maslow and Gagne's (Hierarchies)

- Maslow's hierarchy of human needs

- Gagne's hierarchy of human learning:

- classical cond.

  - Instrumental cond.

  - Discrimination learning

  - Concept learning

  - Principle learning

  - Etc.

Maslow's hierarchy of human needs

- Self Actualization
- Affiliation/Intimacy
- Family Groups
- Shelter
- Safety
- Food
- Air & Water

How Maslow's Hierarchy is Subsumed Under New Theory

- Lower needs in the Maslow's hierarchy are most highly reinforcing and elicit behaviors to satisfy those needs until need is met

- As lower needs are met by targeted goal directed behavior, continued behavior becomes less reinforcing and higher needs more reinforcing, thus eliciting and reinforcing new behaviors higher in the hierarchy
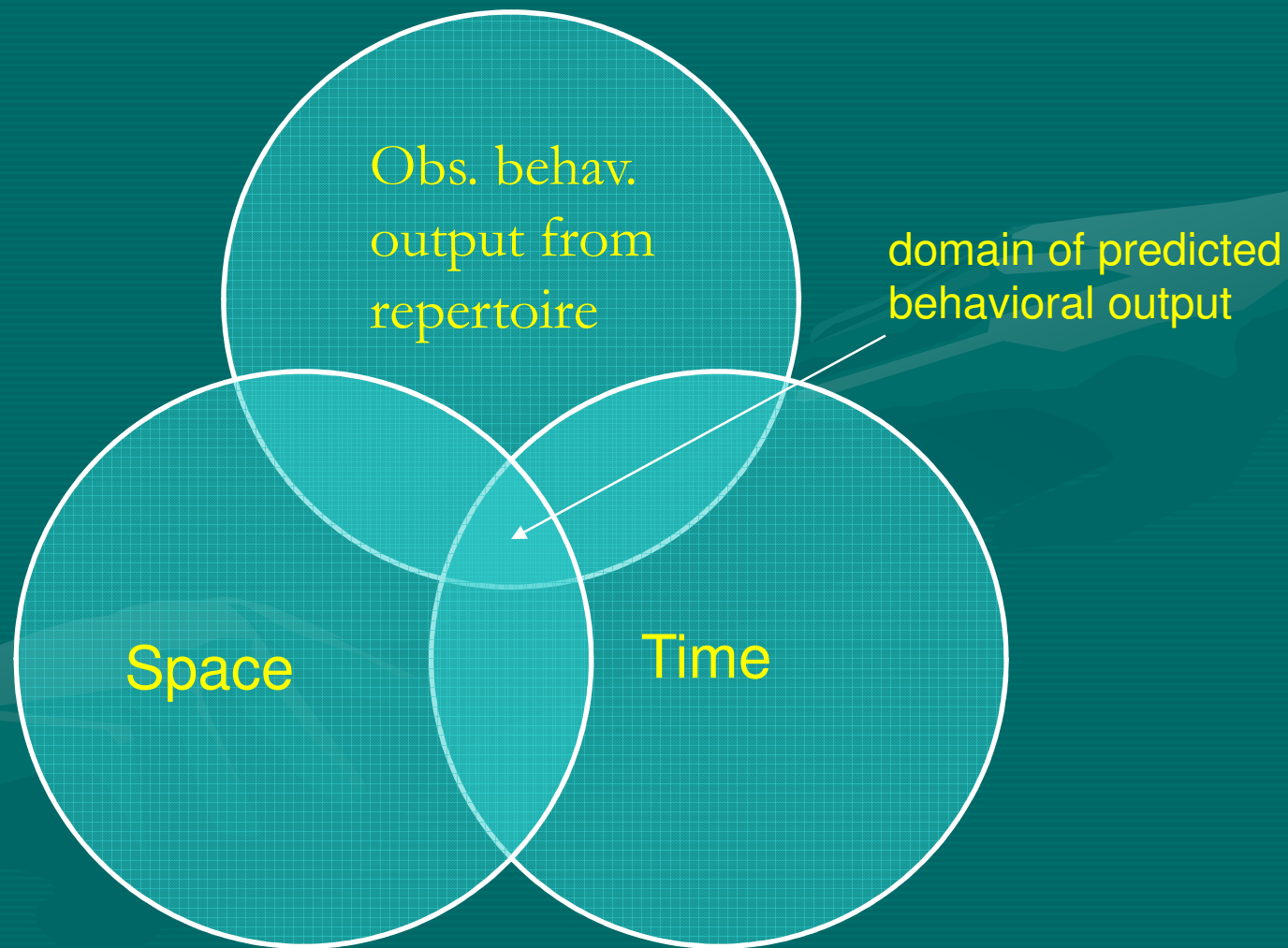
How Gagne's Hierarchy is Subsumed Under New Theory

- Increasingly complex forms of learned behavior are presumed to be included in the explanatory concept of the developing Basic Behavioral Repertoire

Initial Explanatory Variables

Obs. Beh. Output

Space

Time
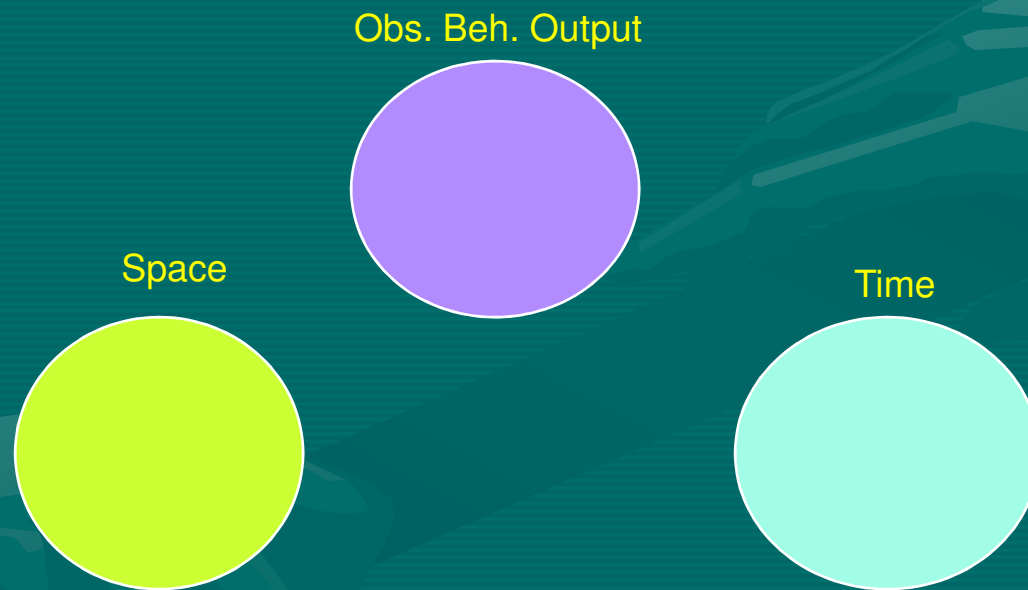
Explanation Occurs at Nexus

Role of Momentary State of Well Being (SWB) at the Nexus

- SWB at nexus provides a positive or negative emotional state which compares to the emotional state of potential behaviors available for the nexus

- SWB at the nexus elicits a behavior from the Basic Behavior Repertoire which best matches the nexus for type (positive or negative) and intensity

Axioms for State of Well Being (SWB)

- <u>Main Axiom</u> – Each human cell has a net factor positive or negative, designated Po or Ng, which can be represented by a number. This is consistent with, but expands, Mowrer's reinforcement system. At conception, the net sum of positive and negative factors from two contributing cells approximate zero sum. When a positive net sum dominates progressive mitotic division sums, the growing fetus thrives. When a negative net sum dominates progressive mitotic sums, the growing fetus becomes more vulnerable to premature death.

• <u>Postulate 1</u> – Po is a positive state, defined as a neurobiological state, subsuming cognitive, emotional, and behavioral status, which is the perceived net well being of the developing fetus. Its strength is defined by the Po's positive sum at any moment and any context. The organism is attracted to all phenomena which increase its net positive sum, and repelled by phenomena which reduce its net positive sum.

• <u>Postulate 2</u> – Ng is a negative, aversive state, (a neurobiological state, subsuming cognitive, emotional, and behavioral status). It is defined as the Ng sum at any moment and any context. The organism is attracted to all phenomena which reduce its Ng sum, and repelled by all phenomena which increase its Ng sum.
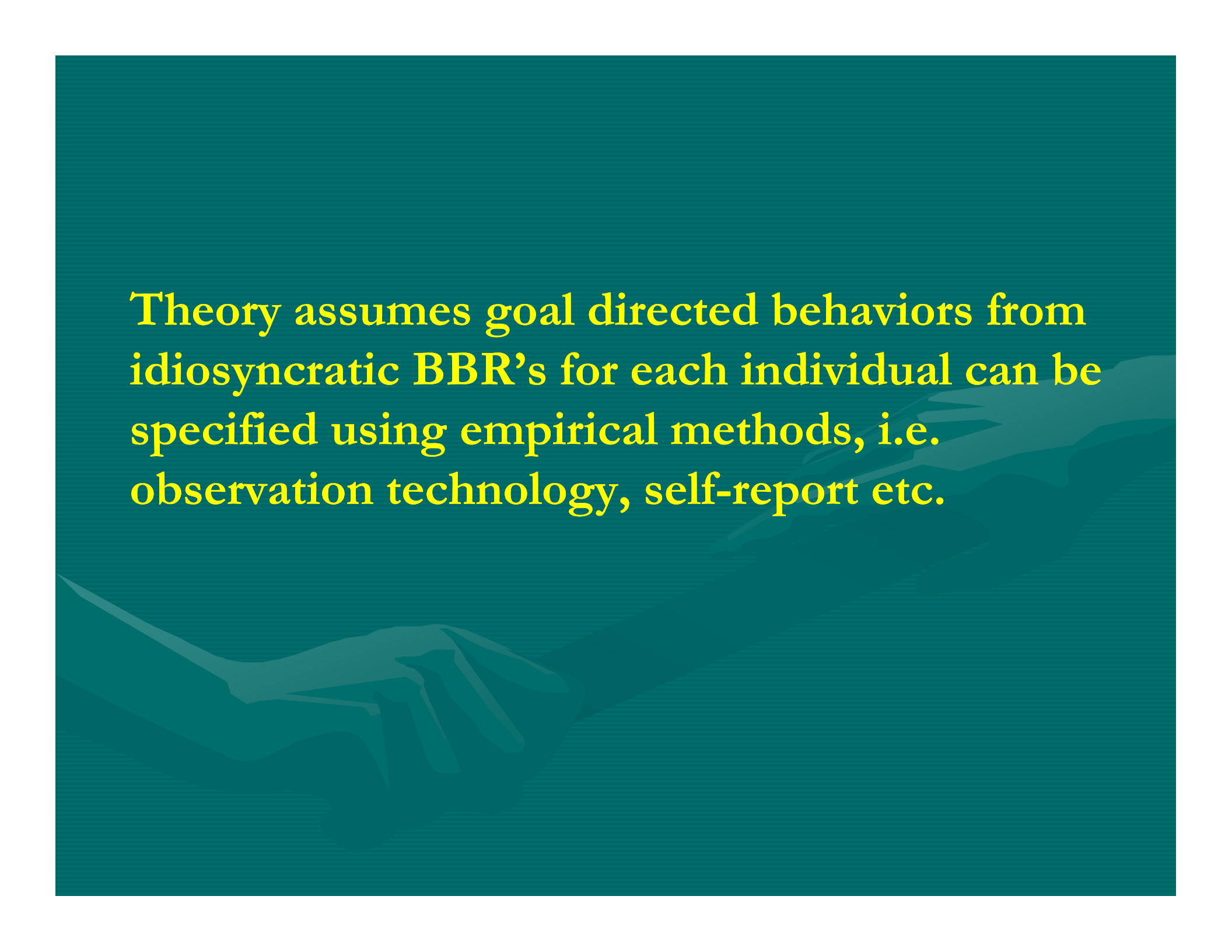
- <u>Postulate 3 </u>– There is no Ng in pure Po.

- <u>Postulate 4 </u>– Imperfect Po is dominated by stronger (higher sum) Ng, and imperfect Ng is dominated by stronger, imperfect Po.

- <u>Postulate 5 </u>– Perfect Po sums, i.e. sums wherein there is no Ng sums, present to dominate, and displace Ng.   Approximate net Po positive sums dominate Ng less.

Postulate 6- Prediction of a particular goal directed behavior, or evolving process of goal directed behavior in real time, can be achieved by accumulating and calculating the unique predicted probabilities of each goal directed behavior from the Basic Behavioral Repertoire at a specified nexus of space and time. The predicted behavior is the one with the highest probability.

Postulate 7 predicts a most probable behavior at any nexus where there is knowledge of specific goal directed behaviors which are most likely to occur at certain space locations and temporal epochs with a predominant SWB Po or Ng state and intensity. If the highest probable behavior is not emitted, the theory predicts the next most probable behavior for that given nexus.

<u>Corollary 7.1</u> For a given nexus of Time, Space, and current SWB type and intensity, the predicted probabilities are logically aligned hierarchically. Thus, if during a particular defined temporal epoch the theory predicts the highest goal directed behavioral from the BBR in the context of current nexus variables, and that predicted behavior is <u>not</u> emitted (observed or recorded), then the ncxt most probable behavior from the hierarchy is predicted. This process is continued until a current goal directed behavior is predicted and observed or a new behavior not in the current hierarchy of the BBR is recorded and assigned an initial Po or Ng value and calculated probability in the revised BBR.

Theory assumes goal directed behaviors from idiosyncratic BBR's for each individual can be specified using empirical methods, i.e. observation technology, self-report etc.

List of Common Behaviors with Their Probability for Thursday, 8-9 p.m.

- working at office p.01
- eating dinner p.01
- using telephone p.02
- reading p.04

- listening to music p.10
- operating computer p.20
- watching TV p.30
- others not listed, p.32

  total p.=1.0

Fig. X. The narrowing cone of predicted behavior from a compendium of goal directed behavior where specifying the space and time nexus, then the SWB type and intensity with relative match to SWB type and intensity maximizes behavior prediction.

BBR

Space X Time

SWB Type/Intensity

Match

Predicted Behavior
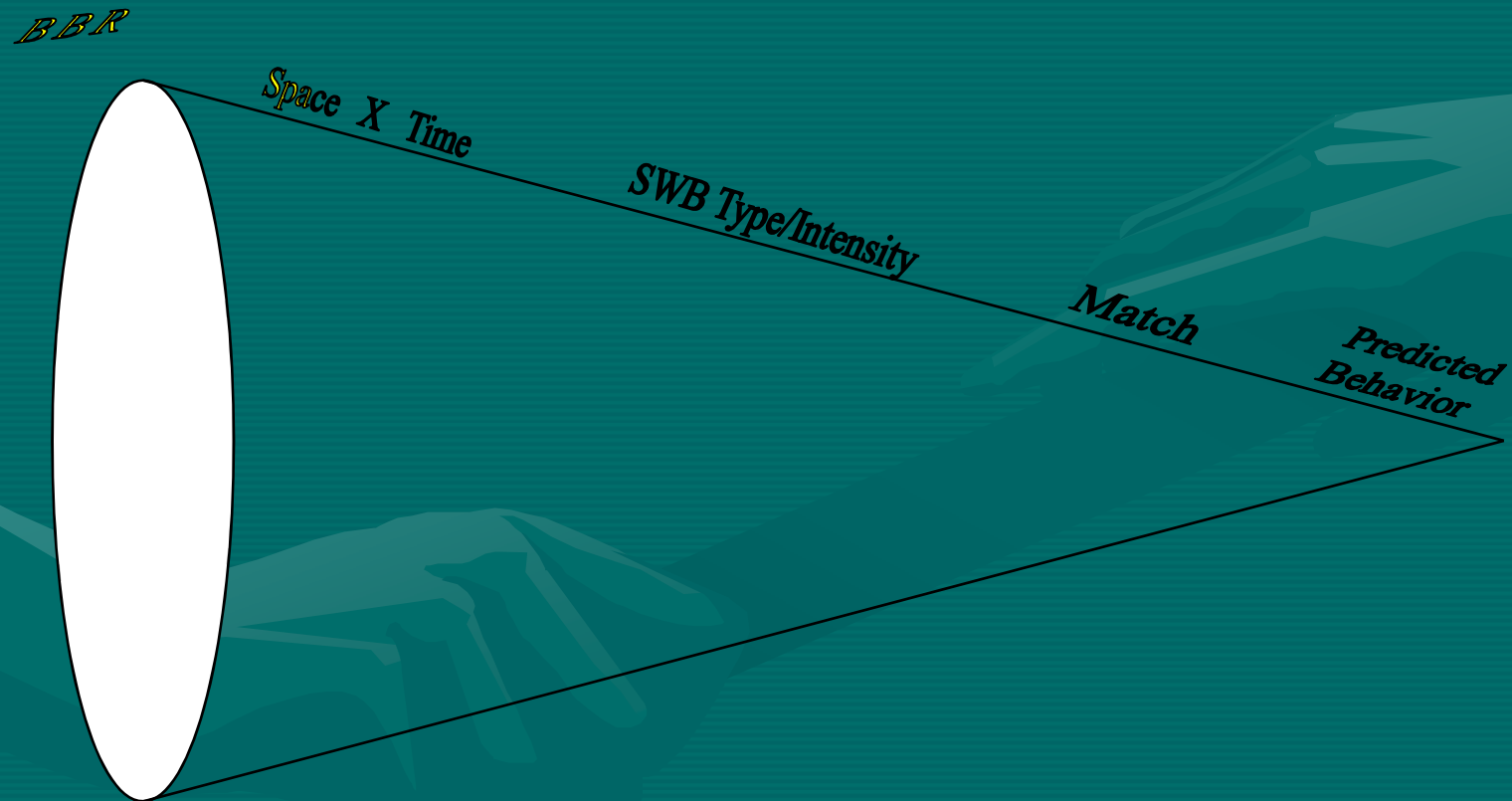
How probability of predicted behavior across time can be increased by knowledge of Ng-Po dominance. Here where Ng is dominant, two predicted behaviors emerge twice during the time span 6 pm to 8 pm.

Space (office)   Predicted Beh. From BBR   Time
Time (8-9 pm)   Ng Dominance   (6-7 pm)

$\longleftarrow \qquad\qquad \longrightarrow$ Working at office

- Operating computer $\longleftarrow \qquad \longrightarrow$ Operating computer

Theory Equation Variables and Definitions

- SWB= momentary state of well being where either Po or Ng is dominant
- Po= designates the net Po state at evolving time with an identified intensity
- Ng= designates the net Ng state at evolving time with an identified intensity
- Nexus= the temporal epoch at a specified space, and SWB type and intensity yields an equation with a predicted behavior probability

Fig. 4a. Added prediction stemming from inclusion of the momentary SWB at the time a goal directed behavior is emitted from the nexus. Predicted is a class of behaviors from the repertoire that either reduce, avoid, or escape Ng, or increase or maintain Po.

Context   Nexus   Emitted Class of Behaviors

Time

Space

(stimuli)

SWB = Po

5 behaviors maintain Po

Thurs.
8-9 pm
8 behaviors
from BBR

SWB - Ng

3 behaviors

Basic Behaviors
reduce Ng
Repertoire (BBR)
1000 behaviors
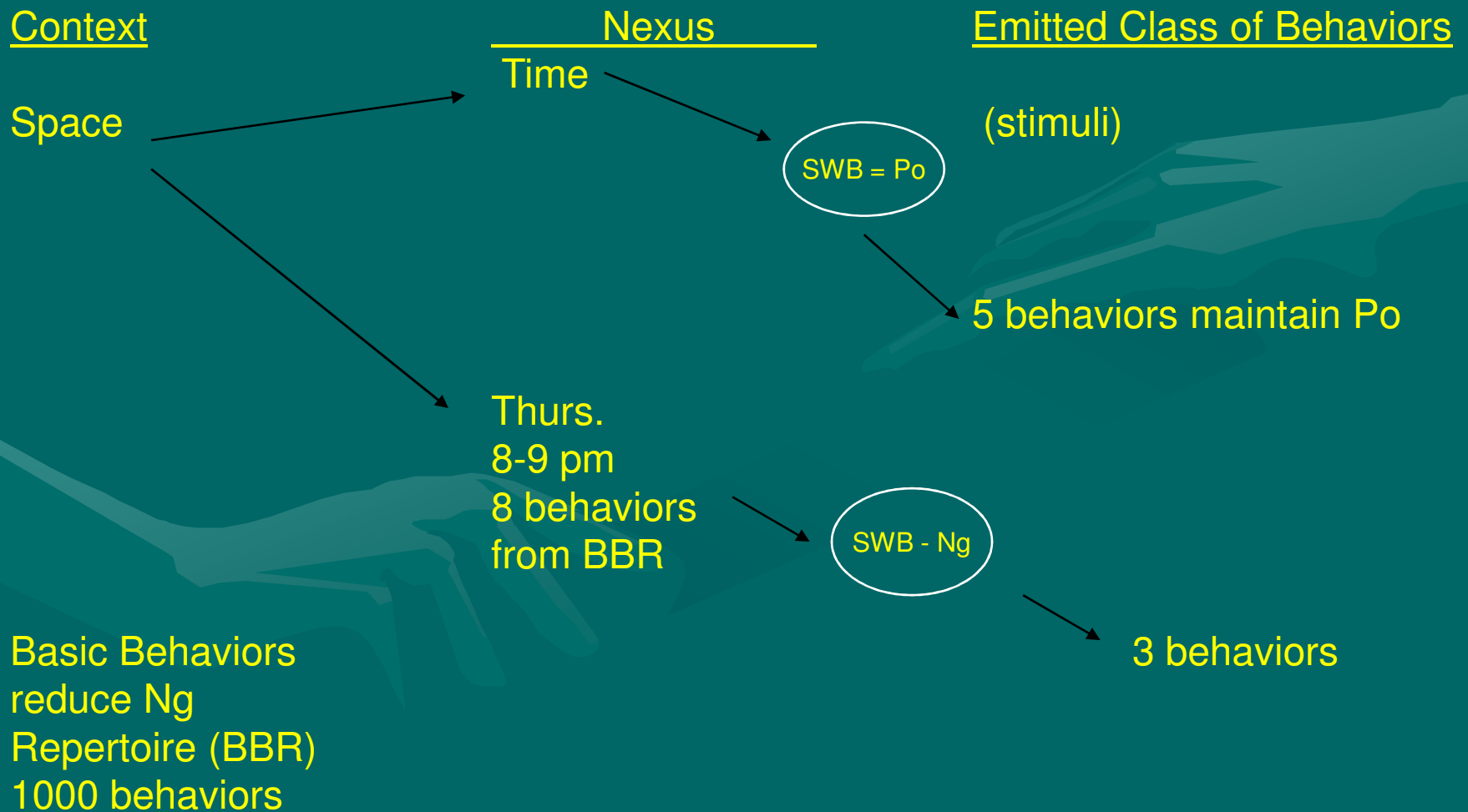
Fig. 4b. Ultimate prediction of behavior from among class of behaviors of the Ng or Po class, depends upon the intensity of the SWB as Ng high or low, or as Po high or low. Illustrated is the Nexus for the same Time and Space as in Fig. 4a, where SWB = Po, but situations where Net Po is high and a situation where net Po is low.

Emitted Behavior From
Class Po High or Low

Nexus

SWB = Po Hi

Po = hi
 4 behaviors

SWB = Po Low

Po = low
5 behaviors from BBR

1
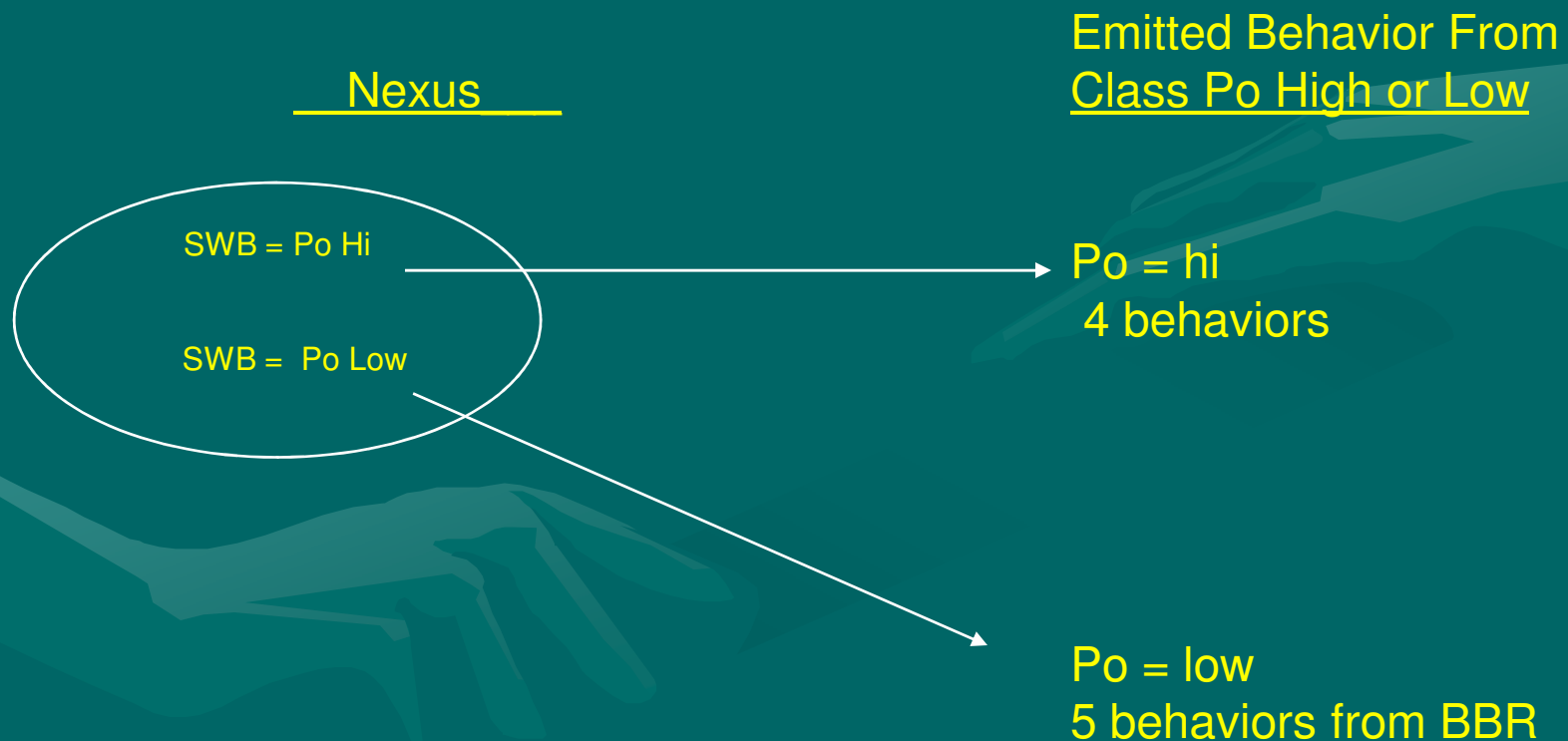
Fig. 5. Prediction of a specific behavior based on observed or measured probable behaviors at the nexus of a specified space, temporal epoch, and stimulus compound from the added variable SWB where either Ng or Po is dominant.

Space A	Epoch	Ng vs. Po Dominance	Emitted Behavior
Home 25 behaviors	1 hr. 8-9 p.m. 12 behaviors	Ng dominant / Po dominant	5 behaviors / 7 behaviors
Space B			
Recreation Center 12 behaviors	1 hr. 6-7 pm. 6 behaviors	Ng dominant / Po dominant	2 behaviors / 4 behaviors
Space C			
Office 9 behaviors	1 hr. 8-9 p.m. 5 behaviors	Ng dominant / Po dominant	2 behaviors / 3 behaviors
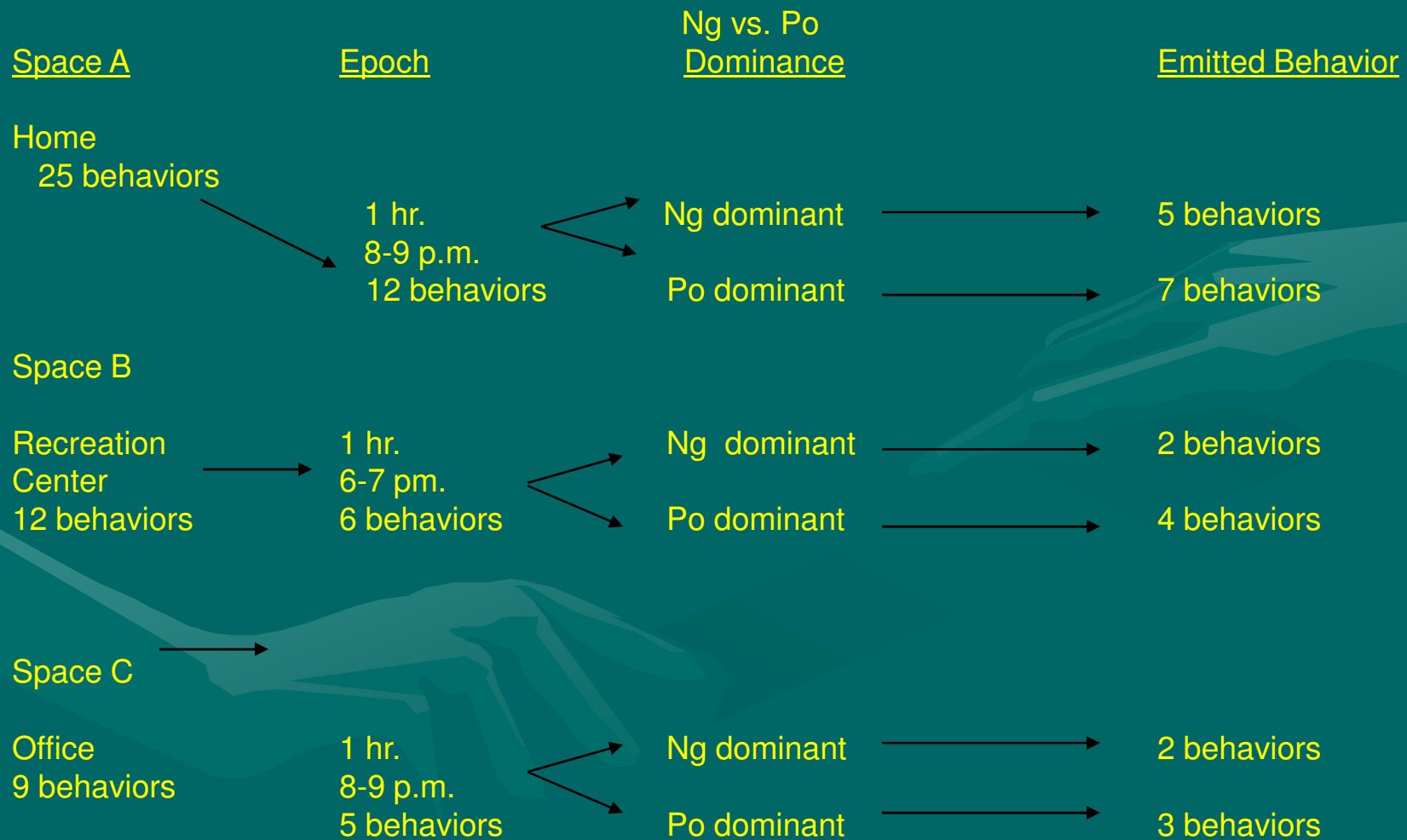
Predicting behavior when Space, Time, BBR components, & SWB are known

List of Common Behaviors with Their Probability
for Thursday, 8-9 p.m.

- working at office p.01
- eating dinner p.01
- using telephone p.02
- reading p.04

- listening to music p.10
- operating computer p.20
- watching TV p.30
- others not listed, p.32

  total p.=1.0

Building Predictive Equations from Theory Variables & Derived Probabilities

- Space- hours in 24 behavior occurs in specified space. For home space= 14/24 hr.=.583

- Time- specified hour(s) in 24 within which behavior is to be predicted. For specified epoch 8-9pm, =1/24 hr. = .042

- Probability of Behavior 2 (eating dinner) from example BBR =.01

Prediction Assuming Probabilities are Additive

- $14/24 + 1/24 + Bh2 \; (= .01) =$

- $.583 + .042 + .01 = .635$

- But prediction does not account for SWB type and intensity value of Bh2 from the BBR, nor the type or intensity match of SWB during the current nexus epoch

Predicting Behavior Using Knowledge of BBR behaviors & associated SWB type and intensity, & current epoch SWB type/intensity

- For a match of type SWB, the predictive equation utilizes an additive constant with value =1.0 subtracted from the subtrahend of the BBR intensity SWB value minus the current SWB intensity value.

- The operation is 1.0 – (BBR, SWB intensity – current SWB intensity)

- The equation then multiplies the summed probabilities by the subtrahend result of 1.0 – the difference between BBR, SWB intensity and current SWB intensity.

Match vs. No Match Implications from Predictive Equation

- If BBR, SWB type & intensity & SWB type and intensity are the same (i.e. a perfect match) net subtraction is zero and summed probabilities are multiplied by 1.0 and maintain their highest predictive probability.

- Any subtraction yielding an imperfect match, say BBR SWB=.5 –current SWB = .4, results in the multiplicand being reduced. In this case it is reduced from X 1.0 to X 0.9.

Final Predictive Equation

- S + T = BBR prob. X (1.0 – [BBB SWB intensity value – current SWB intensity value]) = Nexus BBR predicted behavioral probability

Table XYZ

- Table XYZ-2 Illustrates results of equation whereby nexus probabilities (probs) are calculated by multiplying probabs of Space, i.e. in the first row (8/24) =.33, X Time (8/24) =.33, and then adding the probability of behavior working at desk (p=.01) from the BBR.

- These operations are followed by the mathematical operations from a match comparison of the BBR SWB type and intensity match, with current nexus SWB type and intensity. The operation is 1.0 – (Ng.2 – Ng.2) = 1.0- 0=1, with the multiplier X 1.0, yielding a prediction probability = 0.1189.

BBR List of Observed Behaviors in Specified Space	BBR List			Nexus Probabilities			Nexus Probabilities Multiplied	1.0-(BBR, SWB type & Value-	- Current SWB Match Value) = __ X	Predicted Probabilities
	SWB	SWB Value	Prob beh.	S	T	BBR =				
Office Work at desk	Ng	.2	.01	8/24=.33 X	8/24=.33 +	.01	.1189 = 1-(Ng.2-		Ng .2)=0 X 1=	0.1189
Home Eating dinner										
Using telephone										
Watching TV Reading, home										
Listening to music										
Operating computer										
Others not listed										

BBR List of Observed Behaviors in Specified Space	BBR List			Nexus Probabilities			Nexus Probs Multiplied	1.0- (BBR, SWB type & Value-	- Current SWB Match Value) = __ X	Predicted Probs
	SWB	SWB Value	Prob beh.	S	T	BBR=				
<u>Office</u> Work at desk	Ng	.2	.01	8/24=.33 X	8/24=.33 +	.01	.1189 x 1-(Ng.2- Ng .2)=0 X 1=			0.1189
<u>Home</u> Eating dinner	Po	.1	.01	.33 X	14/24 =.1925 +	.01	**..2025 x 1-(Po.1 - Ng .1)=0) X 1=**			**0.2025**
Using telephone	Po	.2	.02	.33 X	" .1995+	.02	**.2195 x 1-(Po.2 - Ng .2) = 0 X 1=**			**0. 2195**
Reading, home	Po	.3	.04	.33 X	' .1995+	.04	.2395 x 1-(Po .3 - Ng .2) =.9 X =			**0.2155**
Listening to music	Po	.3	.10	.33 X	" .1995+	.10	**.2995 x 1- (Po.3- Po.3) = 0 X 1.=**			**0.2995**

BBR List of Observed Behaviors in Specified Space	BBR List			Nexus Probabilities			Nexus Probabilities Multiplied	1.0- (BBR, SWB type & Value-	- Current SWB Match Value) = __ X	Predicted Probabilities
	SWB	SWB Value	Prob beh.	S	T	BBR =				
Operating computer	Po	.3	.20	.33 X	" .1995+	.20	**.3995** x 1- (Po.3-Ng.2) =**..9** X **.9=**			**0.3595**
Watching TV	Po	.3	.30	.33 X	" .1995+	.30	**.4995** x 1- (Po.3- Po.3) = **0** X 1=			**0.4995**
Others not listed	Po	.4	.32 Total P=1.0	.33 X	" .1995+	.32 Total P=1. 0	**prediction, assuming perfect match SWB type and intensity .5195** x 1- (Po .4 - Po .4) =**0** X 1=			**0.5195**

Current Path to Theory Strengths

- Potential for organizing and explaining multiple domains of psychological knowledge & lawful phenomena using concepts & principles shared across knowledge domains.

- Quantitative logical structure clearly implies experiments derived to gather supporting or non-supporting evidence for the theory.

- From proposed & future equations, it may be possible, even when a proposed variable cannot be precisely defined, to predict behaviors for an individual at a specified nexus.

- Potential to be used for multiple applied purposes.

- May facilitate possibility it can be integrated with, if not subsume, other circumscribed theories in current disparate knowledge and theory domains.

- May be improved by collapsing the SWB type variable Po & Ng to a parsimonious variable which reflects "making it better".

Current Path to Theory Problems (1)

- Problematic definition of goal directed behavior
- Existing measure of space, precision GPS, may not be precise enough to specify details of a true discriminative stimulus for emitted behavior.
- No existing measurement for specifying extant BBR
- No empirical data to support theory's implications and predictions
- No existing quantitative articulation with other empirically grounded quantitative theories

Current Path to Theory Problems (2)

- Equation language (common math notation) does not specify precisely what text is saying. Thus current text and equation language are not isomorphic. We are working on this!

- Because similar constructs (emotional state and intensity) are used for the equation and to record and codify behavior via artificial intelligence (AI) software for each individual's Basic Behavioral Repertoire, there is a risk of tautological reasoning and hypostatization (explaining by naming).

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