

EPISTEMIC IDENTITY AND UNDERGRADUATE STUDENTS' UNDERSTANDINGS OF PSYCHOLOGY

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Abstract: *Epistemic identity refers to dispositional ways of knowing and beliefs about the nature of knowledge that characterize an individual or group. The epistemic phases and positions that inform an understanding of psychology contribute greatly to its role and acceptance in higher education and general society. The aim of this study is to (a) explore the epistemic dimension of students' understandings of psychology and (b) initiate a broader discussion on the value and facilitation of students' epistemological identity and development in relation to the nature of their domains of study. Specifically, a sample of 104 undergraduate psychology students across four year-level cohorts was surveyed in relation to 20 bi-polar constructs to determine students' epistemic identity. Data were analysed for cohort, age and gender differences between dichotomous and dialogical epistemologies. A significant difference in epistemic identity was observed across all four year-level cohorts, $F(12,297) = 3.8, p = .00$; Wilks Lambda = .63; $\eta^2 = .14$, which suggests that as students' progress through their education so too does their epistemic identity progress to more sophisticated ways of knowing. Across all year levels, there was a significant gender effect for the absolutist epistemic identity $F(1, 102) = 5.33, p = .023$. Male students were more likely to agree with one construct within a binary and disagree with the other. The discussion considers the implications of these results for the accommodation and development of epistemic identity in an undergraduate psychology degree.*

Keywords: *Epistemic Identity, Psychology, Undergraduate Students*

Introduction

Epistemology is the study of ways of knowing and beliefs about the nature of knowledge. Epistemic identity refers to dispositional ways of knowing and beliefs about the nature of knowledge that characterize an individual or group. The aim of this study is to explore the

epistemic identity and epistemological development of undergraduate students in relation to the domain of *psychology*.

An expanding body of research based on Perry's (1970) seminal study of undergraduate epistemologies suggests that as individuals progress through their education so too do they progress to more sophisticated ways of knowing and learning (Baxter-Magolda, 1988, 2006; King & Kitchener, 2004). Sophisticated epistemological beliefs have been associated with 'deep' approaches to learning which involve intrinsic motivation, self-directed learning, a focus on understanding the subject material and knowledge construction (Green & Hood, 2013). Students who display such epistemological beliefs demonstrate greater mastery of material and have better academic achievement (Green & Hood, 2013). Moreover, an individual's movement towards more sophisticated ways of knowing (i.e., *epistemological development*) has been argued to facilitate adaptation and thriving in workplace environments that are characterised by 'ill-defined problems' (Valanides & Angeli, 2008). The interface between student epistemologies, teacher epistemologies and institutional epistemologies is an important site for the understanding of learning and the formation of professional identity.

The evidence surrounding formal education as an influence on the development of personal epistemology highlights the need for tools to map domain-specific epistemological identities and developments. Such research could help educators to plan more effective learning experiences that accommodate diverse epistemic identities and facilitate epistemological development in relation to a domain-specific identity. It could also inform pedagogies that encourage students to develop their autonomy and identity as possessors and creators of knowledge (Claxton, 2006).

Literature Review

Psychology represents a domain of knowledge with diverse and often contested ways of knowing. As such, it represents a significant domain for the study of students' epistemological identity and development. Indeed, psychology's *identity crisis* has been well documented and clearly articulated for nearly a century (e.g., Buhler, 1929; Henriques, 2004; Shultz & Shultz, 2016). For example, one of the more persistent tensions that defines, divides and sometimes unites the domain of psychology in higher education is between *objective* and *subjective* representations of knowledge. This bi-polar construct has strong conceptual affinities with *positivist/constructivist*, *universalist/relativist*, *individual/social*, *reductive/holistic* and *empirical/phenomenological* approaches to knowledge. This particular epistemic tension and its persistence is illustrated in Costin's (1964) early attempts to characterise psychology as an objective science:

"The common goal of the first course in psychology is for students to acquire specific information concerning the scientific and professional characteristics of psychology. Usually this knowledge includes the meaning of 'science' as related to psychology, techniques of describing and explaining psychological phenomena, scientific and professional areas of specialization, and the relationship of these areas to other scientific and professional fields. Practically all elementary psychology text books present these topics, while most instructors of the introductory course discuss and examine their students' understanding of this kind of information. As a rule, instructors regard the gaining of such knowledge as part of a broader goal - the development of more objective ways of observing and interpreting behaviour". (p. 458)

However, this type of approach to psychology is challenged by others like Darlaston-Jones (2007) as lacking epistemic reflexivity and overstating the strength of the positivist stance:

“The relationship between epistemology and method is rarely articulated through our formal coursework education either at undergraduate or postgraduate level; certainly, this is true in many psychology programmes . . . I begin by outlining the constructionist view and differentiating this from the positivist stance. I do this for two reasons; first, to demonstrate the dominance of the positivist perspective in psychology students’ education and second, because I personally subscribe to a constructionist worldview”. (p. 19-20)

The tension between objectivist and subjectivist, positivist and constructivist epistemologies have some affinity with traditional psychology’s tendency to isolate individual cognition from fluid and formative social contexts emphasized by social constructivists.

The appreciation of psychology as relationally and contextually objective *and* subjective, positivist *and* constructivist, fixed *and* fluid, unified *and* diverse is a complex epistemic task. Indeed, one of several relatively recent commentaries on the diversity of psychology within higher education argues:

“Calls for unification, no matter how well articulated, will likely fall on deaf ears since there are already deeply entrenched positions in the discipline that are supported by the implicit unity of method and framework . . . the current state of psychological theory and its attendant features is neither fixed nor entirely fluid”. (Stam, 2004, p. 1262)

This is not to discount either a positivist or constructivist approach to psychology; it is to appreciate the necessary tensions *and* potential syntheses between them, in context. The title and content of Lewine’s (2005) article - *Unity in Psychology: Possibility or Pipedream?* - are testament to the ongoing struggle to identify the nature of psychology. More recently Shultz and Shultz (2016) reiterated the general theme that there are multiple and sometimes conflicting paradigms operating to define Psychology. An epistemological perspective on this identity crisis affirms the importance of recognising it and realising that there are more and less developed ways of coordinating seemingly disparate perspectives.

Students’ ability to understand and respond to this contestability beyond exclusively oppositional ways is an important epistemic task. Ardila (2007) identified a range of identity dilemmas in psychology including, whether it: is a basic and/or applied science; a natural, behavioural, social and/or human science or humanity; or makes universal and/or contextual claims. Gervasio, Wendorf and Yoder’s (2010) study noted that compared to non-majors, Psychology majors were more likely to conceptualise Psychology as both a research science and as a helping profession. Research by Kaartinen-Koutaniemi and Lindblom (2008) indicated that Psychology students are more likely to use the scientific method to evaluate knowledge. Other research by Holmes (2014) revealed that instructors more than students tended to view psychology as scientific research, with students being more interested in its practitioner activities. With its focus on student retention in psychology courses, Holmes’ study reveals the effects of conceptualising psychology in particular ways. In a provocative study by Howell, Collisson and King (2014) it was suggested that psychologists find little agreement on the core content areas of the discipline and tend to suffer ‘physics envy’ in wanting to establish a more theoretically and empirically grounded understanding of its nature. It therefore becomes

imperative to examine how students studying Psychology navigate the different tensions within the discipline to arrive at their own epistemological belief system.

Notwithstanding tensions within the discipline, there is some indication that Psychology students may have an epistemological advantage because the nature of the discipline requires that they integrate knowledge from multiple and sometimes conflicting theoretical perspectives (Reddy, Hammond, Lewandowska, Trapp & Marques, 2014). Furthermore, psychology students' interest and performance in their courses has been found to be correlated with their epistemic understanding of psychology in relation to the significance of psychological research, the subjective nature of psychological knowledge, and the predictability of human behaviour (Renken, McMahan & Nitkova, 2015). Any particular psychology student, lecturer, or course may emphasise different sides of these dilemmas by different degrees. An important epistemological question is to what extent students may be able to recognise and coordinate seemingly competing perspectives?

Arnett (2008) problematises the American Psychological Association (APA)'s psychological research profile, which influences an international audience's understanding of psychology based on research which focusses on Americans who constitute 5% of the world's population. It is likely that the nature of psychology as a discipline is similarly a reflection of its most dominant cultural communicators. Santos and Martins (2013) raise this concern in relation to the cultural embeddedness of scientism that can inhibit fruitful interdisciplinary understandings of psychology. Of course, this is more of an observation than a critique, but it may be one that epistemologically more developed students should be able to recognise and process in relation to their understanding of the contestability, cultural embeddedness *and* universal themes of psychology.

The epistemic approach taken in this paper is dialogical and evaluative in recognition that the binaries that define psychology are relational and contextual. In the concrete, the binaries frame useful and necessary dichotomies that facilitate choices in context. In the abstract, the binaries serve as interdependent polarities containing a spectrum of possibilities and degrees of difference.

The epistemic phases and positions that inform an understanding of psychology contribute greatly to its role and acceptance in higher education and general society. Accordingly, the aim of this study is to (a) explore the epistemic dimension of students' understandings of psychology and (b) initiate a broader discussion on the value and facilitation of students' epistemological identity and development in relation to the nature of their domains of study.

Theoretical Framework

Bi-polar Constructs and Epistemological Development

This study utilises bi-polar constructs to map (a) students' perceptions of psychology as a field of study and (b) students' ways of structuring knowledge in relation to psychology. Bi-polar constructs represent common concept pairs that are (1) relatable to the same phenomenon (e.g., subjective/objective *knowledge*); (2) mutually exclusive (e.g., what is subjective is not objective at the same time from the same perspective); (3) mutually definitive (e.g., subjective is not objective and objective is not subjective); (4) polarities separated by degrees (e.g., knowledge may be perceived as more or less subjective or objective), and (5) relative (e.g., what is subjective may be objective at the same time from a different perspective).

Bi-polar constructs may be related dichotomously (i.e., in opposition), dialectically (i.e., as equals in synthesis), or dialogically (i.e., as abstract equals in concrete opposition) (Adam, 2016). *Dichotomous epistemologies* emphasise the opposition and irreconcilability of a bipolar concept and the primacy of one or the other pole. For example, in the individual/social construct applied to psychology, *either* the individual *or* the social is seen as the ‘true’ nature of psychology. *Dualistic epistemologies* emphasise the irreducibility and equality of poles. For example, in the individual/social construct applied to psychology, *both* the individual *and* the social are seen as equally contributing to the nature of psychology. *Dialogical epistemologies* recognise the interdependent equality of poles in the abstract *and* the necessary opposition and irreconcilability of poles in concrete contexts. For example, in the individual/social construct applied to psychology, *both* the individual *and* the social contribute equally to the nature of psychology, while each may be emphasised and utilised differentially and preferentially to understand or transform a particular context within psychology.

In developmental terms, a consensus of research and theory seems to support a movement from *either/or* knowing as an early disposition to *both/and* knowing as a middle disposition and *both/and/either/or/neither/nor* knowing as a later disposition. There are many equivalent terms in developmental theories that reflect these general dispositions (see Adam, 2016, p.101; West, 2004, p. 65). In the context of this study, the dispositions reflect different ways of knowing the relationship between bipolar constructs (i.e. dyads) that relate to the nature of psychology (e.g. pure/applied; individual/social; qualitative/quantitative; subjective/objective).

While several theories (i.e., Perry, 1970) of epistemological development imply a movement beyond the disposition to dichotomising ways of knowing, few explicitly account for, or measure development in relation to domain-specific binary constructs, especially in the domain of *psychology*. This study seeks to identify a cross-sectional development of the ways in which psychology students engage characteristic oppositions, syntheses and tensions in the domain of psychology.

Either implicit or explicit use of binary constructs in determining epistemic positions can be found in the work of Kelly (1955), Perry (1970), Reich (2002) and Adam (2012a, 2012b). Kelly theorised that people create bipolar dimensions of meaning, which they use to make sense of life experiences and anticipate the future. His Repertory Grid elicits bipolar constructs to map participant values and judgements in context. Perry’s schema of epistemological development included duality or binary function coding’s of student narratives to indicate epistemological positions on a nine-point scale. This nine-point scale can be condensed into three overarching positions including (1) dualism, (2) multiplism, and (3) commitment within relativism. These positions are congruent with the dichotomous, dialectical and dialogical model. Similarly, Reich (2002) proposes a relational and contextual (RCR) approach to knowledge as a final development beyond dualistic either/or thinking. Adam’s (2011, 2012a, 2012b) binary-epistemic approach uses domain-specific and domain-general binary constructs to map epistemic positions and trajectories of cohorts and individual participants. Adam proposes a linear-cyclic change involving the *creation, emergence, opposition, convergence, and collapse* of binary constructs in personal and organisational epistemologies.

Collectively, these approaches support the general consensus of epistemological theories of development identified by Tabak and Weinstock (2008) as proceeding from:

- (1) *absolutist* – the conception of knowledge and knowing as objective and absolute; to
- (2) *multiplist* – regarding all knowledge as subjective and relative and, therefore, indeterminate because of multiple points of view; to
- (3) *evaluativist* – the acceptance and integration of subjective and objective aspects of knowledge that would permit a degree of evaluation and judgement of knowledge claims. (p. 178)

West (2004) provides a framework for understanding epistemic identity which reflects four epistemic positions derived from Perry (1970), Baxter Magolda (2006), and King and Kitchener, (2004). An individual with an *evaluative epistemic position* will be able to evaluate evidence for both sides of the binary construct and deliberate that *both/either/neither* are relevant to some degree in-context and in-relation. Someone with an *absolutist epistemic position* however will identify more exclusively with one construct within a binary and disagree with the other across contexts. A student with a *personal epistemic position* will demonstrate high fluctuation in responses, as their reasoning will not be guided by personal experience that is not well connected through abstraction. The fourth epistemic position that a student may demonstrate is a *rule based epistemic position*. In this position the student will demonstrate some evaluative skills however will always need to slightly agree with one side of the binary construct over the other. In this position the student may identify with both binary constructs but not see them as relational and contextual.

Informed by this general approach to epistemological development, this study uses binary constructs to explore epistemic differences in cohort constructions of *psychology*. Its general premise is that later cohorts in an undergraduate course will demonstrate less dichotomising (i.e., absolutist, oppositional, polarised) approaches to psychology than earlier cohorts, when identifying *psychology* as an abstraction in relation to binary constructs.

Therefore, it is hypothesised that:

1. 1st year students will demonstrate higher levels of dichotomous knowing, and 4th year students should demonstrate higher levels of dialectical or dialogical knowing. Using West's terminology this equates to 1st year students identifying more strongly with *absolutist* and *personal* epistemic positions, while 4th year students will have a higher *evaluative* epistemic identity in relation to the domain of Psychology. Epistemic identities of earlier year cohorts will be more *rules based*.
2. when year level within the undergraduate cohort is controlled for, increased age will also be correlated with decreased epistemological dichotomisation.
3. all binaries will be considered relevant to the field of Psychology i.e. there will not be a difference across grade level for individual binary items when assessed for relevance.

Methodology

A cross sectional design was implemented in an attempt to observe (a) epistemic identity in relation to psychology, and (b) general differences in epistemic identity between the first and final year cohorts in an undergraduate psychology degree. To recall, the premise guiding the study is that as students' progress through their education, so too should their epistemic identity progress to a more sophisticated way of thinking and knowing.

Data Collection Technique

Data was collected using a quantitative survey, which could be completed online, or by paper and pen.

Binary Identification

The survey utilised a variant of a Binary Differential Scale (BDS) (Adam, 2011) to identify participants' epistemic positions in relation to twenty binary constructs informed by the literature on conceptualizations of Psychology (Ardila, 2007; Holmes, 2014; Lewine, 2005; Renken et al., 2015; Shultz & Shultz, 2016). The BDS allows a participant to select one or more positions on a seven-point scale (i.e., 3,2,1,0,1,2,3) corresponding to seven identifications (*strong, moderate, weak, none, weak, moderate, strong*) in relation to a binary construct. For the purposes of this study (i.e., online administration), the left and right binary were divided into separate consecutive items with reciprocal scales (i.e., Left – *strong, moderate, weak, no*; Right binary – *weak, moderate, strong, no*). Each part (i.e., the left binary and right binary) is identified by a common term and generic definition. (Refer to Table 1). The scale allows participants to indicate their level of identification with each part of a binary construct in relation to a specified domain (i.e. Psychology).

Binary Relevance

The survey also included an item for participants to indicate the relevance of the binary construct to the specified domain. The relevance scale for the binary construct enabled students to respond either (a) No relevance, (b) Weak relevance, (c) Moderate relevance or, (d) High relevance. For the purposes of multivariate analysis, the survey also included basic items to collect demographic information on age and gender.

Table 1: Binary Constructs

Left Binary	Right Binary
Qualitative: Concerned with qualities and thematic relationships	Quantitative: Concerned with quantities and numerical relationships
Individual: Concerned with individual dynamics	Social: Concerned with social dynamics
Reductive: Concerned with examining a complex thing as a collection of parts	Holistic: Concerned with examining a complex thing as an interrelated whole
Multivariate: Many reasons or factors explain phenomena	Univariate: Phenomena can be explained with a single cause
Subjective: Concerned with constructing fluid and individual perspectives	Objective: Concerned with discovering fixed and universal facts
Helping profession: Concerned with helping people	Scientific: Concerned with testing theory and developing theory through the scientific method
Individually oriented: Concerned with the individual person	Socially oriented: Social aspects/systems considered; group treatment emphasised
Realistic: Concerned with helping people through research or practice	Idealistic: Concerned with changing the world
Phenomenological: Theory which is not based on empiricism	Empirical: Based on empirically tested theory
Definitive: Psychological theory represents irrefutable truth	Theoretical: Psychological constructs and relationships between them are open to testing

Personal: Concerned with understanding oneself better	Inapplicable: Is not able to be applied to the self
Practical: theory and research can be applied to solve human problems	Useless: Relevance of psychological content being taught is not apparent
Common sense: The subject matter and findings of most psychological research may appear to be common sense	Illogical: Knowledge gained from research does not confirm expectations
Therapeutic: Individuals with mental problems can be helped with counselling or other therapy	Drug reliant: Pharmacotherapy is an essential aspect of treatment
Diagnostic: Established criteria are used to determine the nature of a mental health problem	Unstructured: Diagnosis of mental health problems is based on clinician experience, extensive clinical interview and time in therapy
Treatment focused: Uses therapy aimed to either change thought patterns or behaviour of the individual	Talking therapy: Talking to a client can be just as helpful as other therapeutic techniques
Medical model: Psychology conforms to the medical model when drugs are administered by psychiatrists	Alternative therapies: Psychology is an alternative approach to treatment
Concrete: Deals with tangible problems	Abstract: Is conceptual and theoretical in its focus
Neurobiological: Much of human behaviour and mental disorder can be explained by the role of the brain and neurochemicals	Behaviourist/Learning explanations: All human behaviour is a result of conditioning or social cognitive learning
Nature: All human behaviour and personality is due to genetic influence	Nurture: Environment plays a significant role in shaping our personality, thoughts, and behaviour

Data Analysis Techniques

Participants' responses were analysed using (1) multivariate analysis of variance (MANOVA) to determine epistemic identity in relation to year level, age, and gender, and (2) analysis of variance (ANOVA) to determine the perceived relevance of binary constructs to the domain of psychology.

Each response was coded numerically according to the binary differential scale (i.e., 3, 2, 1, 0). For example, a moderate identification was coded as 2, whereas a strong identification was coded as 3. Since the determination of epistemic position relied on a combination of answers within each binary construct, epistemic positions were also assigned a specific score based on the pairing of identification scores. Using West's (2004) framework a participant who strongly identified with one binary and weakly identified with the opposing binary within the construct, was determined to have an *absolute epistemic position*. The participant who demonstrated this response pattern was then given a total score of 4 for that construct. A student with a *personal epistemic position* response pattern would be indicated by no identification, weak identification to either binaries, or moderate identification to either binary. The student demonstrating this response pattern was then given a respective score of 0, 1 or 2. Students in the *evaluative epistemic position* indicated moderate identification with both binaries, or a strong identification with both binaries, so they were assigned a score of 5 or 6. All other combinations

of identifications to binaries within a construct were categorized as having a *rules based epistemic position* and given a respective score of 3. An average was then taken across the binaries for each participant to gain an overall epistemic position or identity for the individual.

Participants

The total sample consisted of 104 undergraduate psychology students, studying at a regional university in North Queensland Australia. The sample included 73 female and 31 male participants. Ages ranged from 17 - 59 years, with a mean age of 24 yrs. Sample sizes across cohorts differed slightly with the 1st year cohort consisting of 33 participants, 2nd year student cohort consisting of 28 participants, 3rd year cohort consisting of 21 participants and 4th year cohort consisting of 22 participants. Table 2 provides participant information.

Table 2: Demographic Characteristics of Students According to Level of University Education

Demographic	Year Level			
	1st Year	2nd Year	3rd Year	4th Year
N	33	28	21	22
Female	18	24	11	19
Male	15	3	10	3
Mean Age (SD)	25(9.91)	22(5.93)	28(9.35)	25(7.58)

Procedure

Ethical clearance was obtained before commencing the research. Use of binary constructs to determine epistemic position however was not envisaged to pose ethical concerns. The binary construct technique popularised by Kelly (1955) has been used for many years in Psychology to understand bipolar dimensions of meaning which individuals use to make sense of life experiences.

Participants were recruited during the course of one year via the university's online Sona research system and during classes where hard paper copies were handed out with an information sheet and consent form attached. Participation was voluntary, and all participants signed a consent form in agreement to participate prior to commencement of the survey. No time frame was given for the student to complete the survey. Once the data was collected then began the process of analysis. After the data was coded and epistemic positions were assigned for each participant the data was analysed.

Results

Preliminary assumption testing was conducted to check for normality, linearity of the dependent variables, multivariate outliers, homogeneity of the variance, co-variance matrices and multicollinearity with no violations observed.

Initial investigation of cohort differences revealed an overall significant difference in epistemic identity across all cohorts, $F(12,297) = 3.8, p = .00$; Wilks Lambda = .63; $\eta^2 = .14$. These differences were observed in all dependent variables with significant differences occurring in the *absolute epistemic position*, $F(3, 100) = 4.2, p = .008, \eta^2 = .112$, the *personal epistemic position*, $F(3, 100) = 4.73, p = .004, \eta^2 = .124$, the *rules based epistemic position*, $F(3, 100) = 4.79, p = .013, \eta^2 = .102$, and the *evaluative epistemic position*, indicating the highest observable difference amongst all cohorts, $F(3, 100) = 10.99, p = .00, \eta^2 = .248$. Overall fourth year students demonstrated the highest evaluative responses, while first year students

demonstrated lowest levels of evaluative responses. These initial results indicate that changes in epistemic identity do occur throughout university education, supporting the first hypothesis presented in this paper.

Further investigations were required to establish individual group differences. A Tukey post hoc was utilized for these purposes and due to the number of dependent variables the alpha level was adjusted to 0.0125 (See Table 3). Post hoc analysis compared 1st and 2nd year cohorts, 1st and 3rd year cohorts, 1st and 4th year cohorts, 2nd and 3rd year cohorts, 2nd and 4th year cohorts and 4th and 3rd year cohorts. Cohorts were compared on all four of the dependent epistemic identity variables *absolute*, *personal*, *rules based* and *evaluative*. The results of the Tukey post hoc analysis revealed a significant difference between 1st and 4th year cohorts on the *absolute* variable $p = .010$, with 1st years demonstrating higher levels of absolute identity responses. Differences between 1st and 4th year cohorts in the *personal epistemic* variable were also observed $p = .008$, with the 1st year cohort also demonstrating higher levels of personal based responses. Differences between 1st and 4th year cohorts were further observed with the 4th year cohort demonstrating higher *evaluative* responses than 1st year students with a significant difference observed $p = .000$. There was no significant difference observed on the *rules-based* variable between 1st and 4th year cohorts.

Differences between other cohorts occurred with a significant difference between 1st and 3rd year cohorts on the *personal* identity variable, $p = .017$, with 1st year students scoring higher on the personal identity scale. Differences between 2nd and 4th year cohorts were observed in the *evaluative* scale $p = .00$, with fourth year students demonstrating higher evaluative responses. The 4th year cohort also demonstrated higher *evaluative* responses when compared to the 3rd year cohort $p = .035$. When examining differences for the *rules based* epistemic position the only significant difference was between the 2nd and 3rd year cohort with the 2nd year cohort demonstrating higher *rules-based* responses $p = .016$. The differences observed between cohorts supports the general premise that as students' progress through their education so too does the progression of their epistemic identity occur. Support for Hypothesis 1 is indicated by the following: Students by their fourth year of university education are demonstrating significantly higher levels of evaluative thinking than all other cohorts; Students in their early stages of university education show higher levels of *absolute* and *personal* knowing.

Table 3: Tukey HSD Classification of Epistemic Position Observed Means by Level of University Education (Adjusted Alpha Level .0125)

		Students epistemic positions responses							
		<u>Absolute</u>		<u>Personal</u>		<u>Rules Based</u>		<u>Evaluative</u>	
Level of university education		N	Subset	Subset	Subset	Subset	Subset	Subset	Subset
4 th Year Cohort		22	3.05	1.14		5.14			10.64
3 rd Year Cohort		21		3.48	1.29		7.43	7.81	
2 nd Year Cohort		28		3.61	2.07		7.79	6.54	
1 st Year Cohort		33		5.06	3.27		6.18	5.48	
<i>p</i>			.013	.019		.014		.019	

Although we did not hypothesise gender differences, an exploratory ANOVA analysis was conducted on the influence of gender on epistemic identity across all cohorts. Results indicated differences in the *absolute* epistemic identity variable, $F(1, 102) = 5.33, p = .023$, with males

scoring higher on this variable. No further analysis was implemented to determine gender differences across year cohorts due to the under representation of male participants in the study. Also due to the underrepresentation of age differences within the sample, Hypothesis 2 in relation to age and epistemic identity was not able to be tested; therefore, age could not be accounted for as an influence on epistemic identity changes.

Analysis of binary relevance through ANOVA revealed all students regarded the binary constructs within the survey to be significantly relevant to the field of psychology with the exception of two constructs. Table 4 presents the results of this analysis. Personally relevant vs. Inapplicable and Common Sense vs. Illogical binary constructs were considered less relevant than the other binaries proposed ($M=2.75$, $SD=0.5$). The Nature vs. Nurture construct was considered highly relevant ($M=4$, $SD=0$). Neurobiological vs. Behaviourist/Learning Explanation and Treatment-focused vs. Talking Therapy binary constructs were also considered highly relevant to the field of psychology by all participants ($M=4$, $SD=0$). All other Binaries were considered on average moderately relevant to the field of psychology ($M= 3.25-3.75$, $SD= 0.5-0.98$). Hypothesis 3 was thus partially supported.

Table 4: Mean Relevance of Binary Constructs Across Year Levels (1= No Relevance 2= Weak Relevance 3= Moderately Relevant 4= Highly Relevant)

Binary Constructs	First years Mean	Second Years Mean	Third Years Mean	Fourth Years Mean	Total Mean	Total SD
Reductive vs. Holistic	3	3	4	4	3.5	0.58
Evidence Based vs. Non-Empirical	2	3	4	4	3.25	0.96
Objective vs. Subjective	3	3	4	3	3.25	0.5
Individual vs. Socially Orientated	3	4	4	4	3.75	0.5
Realistic vs. Idealistic	3	4	2	3	3	0.82
Nature-focused vs. Nurture-focused	4	4	4	4	4	0
Helping Profession vs. Scientific Profession	4	3	4	4	3.75	0.5
Concrete vs. Abstract	3	3	4	4	3.5	0.58
Phenomenological vs. Empirical	3	3	4	3	3.25	0.5
Theoretical vs. Definite	2	3	3	4	3	0.82
Personally Relevant vs. Inapplicable	2	3	3	3	2.75*	0.5
Practical vs. Useless	3	3	3	4	3.25	0.5
Common sense vs. Illogical	3	3	3	2	2.75*	0.5
Therapeutic vs. Drug Reliant	3	3	3	4	3.25	0.5
Diagnostic vs. Unstructured	3	3	4	4	3.5	0.58
Qualitative vs. Quantitative	3	3	4	4	3.5	0.58
Treatment-focused vs. Talking Therapy	4	4	4	4	4	0
Medical Model vs. Alternative Therapy	3	3	4	4	3.5	0.58

Univariate Explanation	vs.	3	3	4	4	3.5	0.58
Multivariate Explanation							
Neurobiological	vs.						
Behaviourist/Learning Explanation		4	4	4	4	4	0

*p<.05

Discussion

The current research used binary constructs (Adam, 2011; 2012b) and West's (2004) epistemic typology to investigate how undergraduate students construct knowledge as a result of their learning experience. Although epistemological beliefs of psychology students have received research attention (Gervasio et al., 2010; Kaartinen-Koutaniemi & Lindblom-Ylänne, 2008; Reddy et al. 2014), currently there is no research, which utilizes binary constructs to map psychology students' epistemic identity. This research begins to fill the gap in this area and highlights the need for future research on this approach compared to the semi-structured reflective judgment interview and narrative approaches (King & Kitchener, 2004; Perry, 1970). Given the significance of epistemological beliefs to learning and teaching (Green & Hood, 2013; Renken et al., 2015), review of student epistemological development can inform pedagogy at key transition times such as 1st year, entry into Honours or into postgraduate courses in order to provide supportive environments for transformative learning. An understanding and mapping of students' epistemic identity is key to educational institutions matching student outcomes to expectations of employers and society. The use of binary constructs provides a simple way for educators to map their students' epistemic identity enabling them to encourage epistemic growth, which is seen as a key factor in producing adults who thrive in the working environment (Valanides & Angeli, 2008).

The current research has supported all hypotheses proposed. The results of this research demonstrate that students maintain a unique set of epistemological beliefs that are constantly being constructed and modified through the student learning experience and social interaction within their learning environment. This is indicated by the significant difference in epistemic identities from 1st year psychology students to 4th year psychology students, with fourth year students demonstrating higher levels of evaluative knowing.

Students come to the profession of Psychology with altruistic goals of helping others and better understanding themselves. Early in their undergraduate learning experience students realise that knowledge is not absolute as they are exposed to differing theoretical viewpoints in a range of psychological areas. Psychology students seem to navigate these contested viewpoints with relative ease. Research by Reddy et al. (2014) indicated that Psychology students have more sophisticated epistemological beliefs compared to students from hard disciplines (e.g. pure sciences) because they have to integrate knowledge from multiple theoretical perspectives. Students learn that Psychology while being a helping profession is also a scientific discipline which uses research and statistics to test theoretical ideas. Psychological training emphasises evaluating knowledge on the strength of the research evidence (Green & Hood, 2013; Kaartinen-Koutaniemi & Lindblom-Ylänne, 2008). By the later stages of their undergraduate training, students use evaluative knowing to construct knowledge from their learning experiences, and reflection on their learning.

Developmental progression of epistemic identity is facilitated via a curriculum which encourages students to express their opinions (personal), critique the evidence (rules-based, evaluative) and in the latter years of the degree create knowledge through their own research

(constructivist). Hofer and Pintrich (1997), Baxter Magolda (1988, 2006), and King and Kitchener (2004) all found that students at the start of their education move through a series of stages or positions in a hierarchical fashion supporting the results of the current study. Students in the 1st and 2nd year cohorts were more likely to demonstrate an absolute epistemic position and a personal epistemic position compared to an evaluative epistemic position of the 4th year cohort.

Synonymous with this developmental progression is the transition from dichotomising epistemologies (either/or thinking) to dialectical epistemologies (both/and thinking) and finally dialogical epistemologies (both/and/or) (Adam, 2016; Perry, 1970). The current findings therefore support the general consensus of epistemological theories of development as proceeding from absolutist to multiplist to evaluativist (Tabak & Weinstock, 2008). One of the significant debates in Psychology concerns whether human behaviour is due to *nature* or *nurture*. First year students view either nature or nurture as relevant explanatory variables. As students' progress through the curriculum they are more likely to argue that nature and nurture are both important, with nurture modifying what nature has endowed the individual.

The nature of disciplines is that knowledge is continuously being created through ongoing research and access to new techniques. The binary *neurobiological-behaviourist/learning explanations* typifies this point. Through advances in neuro-imaging our understanding of the neurobiology of many disorders such as depression, obsessive-compulsive disorder and post-traumatic stress disorder has been enhanced. First year students were just as aware as any other year level of the importance of neurobiological explanations for much of human behaviour. The relevance of neurobiology to psychology, one would expect would not have been endorsed in a similar way by undergraduate students 40 years ago.

In regard to the relevance of binaries measured within this research, most binaries were considered relevant to the field of psychology for all students who participated. One of the more prominent identity dilemmas in the literature (Ardila, 2007; Shultz & Shultz, 2016) concerns whether Psychology is a research science or a helping profession. This was assessed in the current study through the binaries (*evidence-based vs non-empirical; helping profession vs scientific profession, empirical vs phenomenological*). First year students were less likely to view the binary *evidence-based versus non-empirical* as relevant to Psychology. Previous research by Gervasio et al. (2010) reported that Psychology majors were more likely to consider both the research and helping aspects of the profession as relevant conceptualizations. Holmes' (2014) research in contrast found that educators more than students emphasized the scientific nature of psychology over the practitioner aspects.

Epistemological development and identity formation can be promoted through a student-centered curriculum which fosters critical thinking and the creation of knowledge through interactive learning experiences and reflectivity. The use of constructivist teaching strategies such as teachers modeling critical thinking, using multiple approaches to be solving problems and making connections to prior knowledge can aid sophisticated epistemic beliefs (Muis & Duffy, 2012) which are important to the development of professional identity. Kimball and Turner (2018) demonstrated that a research culture which is inclusive of undergraduate students in an apprentice-style learning experience can facilitate an identify shift from novice to expert researcher. A curriculum which encourages transformative learning experiences that facilitate constructivist and evaluative epistemologies will promote graduates with confident professional identities.

From the current study, the existing curriculum is contributing to identity changes of undergraduate students from dichotomizing to dialogical selves in the later stages of their university learning experience. As these students move into their chosen profession one would expect them to have epistemic identities as clinical practitioners who base their practice on evidence-based research. Alternatively, those students with strong evaluative and rules-based epistemic identities may come to view themselves as research psychologists and pursue an academic career. While undergraduate psychological training in Australia does not allow students to do clinical practicums, greater exposure to psychologists in the community through guest lectures or through student member participation in their professional body, the Australian Psychological Society conferences and workshops, would be beneficial in providing students with different epistemic positions to enrich their learning experience.

Limitations and Future Directions

Some limitations of the current research should be acknowledged, and suggestions made for future directions. While the current study provided some insight into how student epistemic identity can be transformed through curriculum it should be noted that the research was cross-sectional in design. One factor that may have influenced the results is exposure to education during the data collection phase. In part, the study did not capture students' epistemic identity at the start of the year, when they may be less informed and naïve, especially in the first-year cohorts. Longitudinal research in this area would provide greater understanding of how individuals' epistemic identity develops across time. The under representation of age and gender within the sample make the results tentative. Future research may improve on this with larger representations of gender and age differences within the sample. Future research in using binary constructs to map students' epistemic identity could include, cross cultural and cross-campus comparisons to increase generalizability of the use of binary constructs. The realm of psychology is not limited to the binaries presented within this research. Further investigation of other relevant binary constructs is also advocated.

Conclusion and Implications

In conclusion the current research has confirmed Shultz and Shultz's (2016) proposition that psychology is a contested space with multiple natures. Psychology students come to the program with diverse approaches to psychology. The curriculum and pedagogy of any psychology course interact with students' perceptions of psychology. Psychology curricula that facilitate students' epistemological development will encourage graduates who can appreciate and coordinate different approaches to psychology without succumbing to absolutism (ie. that one approach to psychology is better than all others across all contexts), or relativism (that no approach to psychology trumps others in context). The nature of psychology, like any discipline, is implicitly and explicitly embedded in its curriculum. Curriculum designers, teachers and lecturers who create metacognitive and epistemically reflective learning experiences may help students to reflect on and engage more deeply with the very nature of their discipline and its internal conflicts and contested spaces.

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