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I CONFERENCIA DE GRADUADOS DE LA SLMFCE

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THE 1st GRADUATE CONFERENCE OF THE SLMFCE

Programa / Resúmenes

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Granada 2010

29 y 30 de septiembre y 1 de octubre

September 29th, 30th and October 1st



Universidad
de Granada
- Máster en Filosofía
Contemporánea
- HUM5007-43791/PGO

PROGRAMA

29/09/2010	19.15 h	Cita en la recepción del hotel Monasterio de los Basílios.	
	20.00 h	Recepción de inauguración de la I Conferencia de Graduados de la SLMFCE y bienvenida a los participantes. En el Carmen de la Victoria	
30/09/2010	09.00 – 10.30	Conferencia: “Conventions: minimal, cultural and ultracultural” <i>Hugo Viciana</i> , U. de París 1 y U. de Islas Baleares Comentarista: <i>Jesús Vega</i> , U. Autónoma de Madrid	
	10.30 – 10.40	Pausa	
	10.40 – 12.10	Conferencia: “El argumento de las trayectorias surrealistas y la carga teórica de la medición” <i>Albert Solé Bellet</i> , Universidad Complutense de Madrid Comentarista: <i>José Antonio Díez</i> , U. de Barcelona	
	12.10 – 12.30	Pausa	
	12.30 – 14.00	Conferencia: “Is anti-individualism trivial? – On the determinity and contentfulness of mental states” <i>Herivelto Souza</i> , Universidad de Brasilia Comentarista: <i>María José Frápolli</i> , U. Granada	
	14.00	Almuerzo	
	16.00 – 17.30	Conferencia: “Vagueness and Time” <i>Giacomo Mancin</i> , Universidad Ca’Foscary Comentarista: <i>María Cerezo</i> , Universidad de Murcia	
	17.30 – 17.50	Pausa	
	17.50 – 19.20	Conferencia: “Using Numbers to Drive in Nails” <i>Daniele Molinini</i> , Universidad de París 7 Comentarista: <i>Susana Berestovoy</i> , Universidad de París 1	
	20.45 h	Cita en la recepción del hotel Monasterio de los Basílios. Paseo por Granada de camino a los <i>Palacios Nazaries</i> de la <i>Alhambra</i> .	
	21.45 – 23.30	Visita de los <i>Palacios Nazaries</i> y <i>Generalife</i> .	
	01/10/2010	09.00 – 10.30	Conferencia: “Prospects for a Comparative Analysis of Set Theory and Semantics” <i>Giulia Terzian</i> , Universidad de Bristol Comentarista: <i>Susana Berestovoy</i> , Universidad de París1
		10.30 – 10.40	Pausa
10.40 – 12.10		Conferencia: “Relativism and Binding: The Case of Predicates of Personal Taste” <i>Dan C. Zeman</i> , Logos, Universidad de Barcelona Comentarista: <i>Fernando Martínez</i> , U. de Granada	
12.10 – 12.30		Pausa	
12.30 – 14.00		Conferencia: “El lingualismo y la psicología del aprendizaje” <i>Miguel Ángel Pérez Jiménez</i> , Pontificia Universidad Javeriana de Bogotá. Comentarista: <i>Esther Romero</i> , U. Granada	
14.00		Clausura	

CRÓNICA

La I Conferencia de Graduados de la SLMFCE tuvo lugar en Granada durante los días 30 de septiembre y 1 de octubre de 2010 auspiciada por la Sociedad de Lógica, Metodología y Filosofía de la Ciencia en España. Las principales entidades financiadoras de la Conferencia fueron la propia SLMFCE y el Máster en Filosofía Contemporánea de la Universidad de Granada. La actividad contó también con la ayuda económica del proyecto de investigación HUM2007-63797 *Conocimiento, racionalidad y acción causal* de la Universidad de Granada. Además, se solicitó la colaboración económica del Ministerio de Ciencia e Innovación, la Junta de Andalucía y la Universidad de Granada. Hasta el momento se ha recibido la sola respuesta del Ministerio a través de una resolución provisional por la que se acuerda conceder a la Conferencia una ayuda de 3000 euros. La actividad fue organizada, bajo la dirección de la Profa. María José Frápolli Sanz, por un grupo de ocho doctorandos y recientes doctores de la Universidad de Granada con el apoyo de la dirección del Departamento de Filosofía I, el Máster en Filosofía Contemporánea y las secretarías de los Departamentos de Filosofía I y 2 de dicha universidad. Las conferencias tuvieron lugar en la Sala de Grados de la Facultad de Psicología y estuvieron abiertas a toda la comunidad universitaria.

La apertura de la Conferencia estuvo a cargo de Hugo Viciana, doctorando en cotutela de las Universidades de Islas Baleares y París I (Francia), quien presentó una ponencia relacionada con la etología y la antropología. A lo largo de su charla, titulada "Conventions: minimal, cultural and ultra-cultural", Viciana propuso una nueva tipología de las convenciones como herramienta interpretativa para el estudio naturalista del comportamiento y de la sociedad. Con este objetivo, el ponente comenzó discutiendo algunos conceptos clásicos relacionados con la idea de 'convención' en David Lewis y su aplicación al estudio de la cultura humana; presentó a continuación la caracterización de las "convenciones mínimas" de Ruth Millikan, a las que consideró insatisfactorias por no hacer ninguna referencia a las capacidades episté-

micas y meta-representacionales de los agentes; y concluyó introduciendo otro tipo de convención, producto de una así llamada "game-theoretic evolutionary dynamics" (Bryan Skyrms). Según Viciana serán estas últimas las que tengan un papel importante en la constitución de una teoría de la convención. El profesor Jesús Vega, de la Universidad Autónoma de Madrid, fue el encargado de comentar esta charla.

La segunda ponencia trató de filosofía de la física y corrió a cargo del Dr. Albert Solé, de la Universidad Complutense de Madrid, quien presentó un trabajo titulado: "The Surreal Trajectories Argument and the Theory-Ladenness of Measurement". Solé defendió la interpretación de la mecánica cuántica propuesta en los años cincuenta por el físico David Bohm, frente a las objeciones planteadas en los noventa a cuenta de ciertos resultados experimentales en la medición de la trayectoria de las partículas, supuestamente inexplicables desde la ontología realista de la mecánica bohmiana. Solé centró su análisis en el modelo de interacción entre partículas que subyace al diseño de esos experimentos, y mostró que las objeciones descansan en una cláusula *cæteris paribus* sobre el funcionamiento de los dispositivos detectores que es incompatible con la mecánica bohmiana. Este resultado ejemplifica, según Solé, el clásico tema de la carga teórica de la medición. En su comentario a esta ponencia, el profesor José Díez, de la Universidad de Barcelona, planteó algunas cuestiones aclaratorias sobre el marco ontológico de la aproximación bohmiana y sobre la estructura lógica del argumento de Solé.

El Dr. Herivelto Souza, de la Universidad de Brasilia (Brasil), cerró los trabajos de la mañana con la ponencia "Is anti-individualism trivial? – On the determinity and contentfulness of mental states". Para comenzar, Souza hizo una introducción al debate sobre el anti-individualismo, refiriéndose al problemático legado dejado por Putnam de entender cómo la mente puede estar fuera de la cabeza (una consecuencia de su famoso lema externalista, según McDowell).

CRÓNICA

Gran parte del trabajo filosófico del anti-individualismo - resaltó la profesora María José Frápolli, de la Universidad de Granada, en sus comentarios al trabajo de Souza - consiste en cambiar el paradigma en el punto en el que es central la metáfora espacial del mundo fuera de la mente; una metáfora que involucra concepciones substancialistas de ambos factores. La pregunta primordial del trabajo de Souza fue la siguiente: una vez que dejamos de lado la idea de que es plausible hablar de límites claros del individuo ¿tiene todavía sentido posicionarse con relación a cómo individuar los estados mentales? Es decir, en ese caso ¿defender el anti-individualismo se vuelve trivial? Tal reflexión pone a prueba lo que llamó el ponente 'los presupuestos ontológicos sobre el concepto de *individuo*' que parecen estar presentes en toda la discusión sobre anti-individualismo, incluyendo a Burge y su recién publicado libro *Origins of Objectivity* (2010). En su reflexión, Souza hizo uso de las herramientas proporcionadas por el filósofo francés Gilbert Simondon.

La cuarta presentación del día fue la ponencia titulada "Vagueness and Time", de Giacomo Mancin, doctorando de la Universidad Ca'Foscari (Italia). En ella se propuso una reformulación del planteamiento de la cuestión de la vaguedad por medio de la clarificación de la noción de tiempo. Partiendo de la vaguedad denominada *óptica*, la que afirma que los objetos del mundo son vagos, Mancin se acercó a casos limítrofes de aplicación de conceptos. En esos casos limítrofes, señaló el ponente, ciertos conceptos pueden dar lugar a paradojas por su vaguedad. Por ejemplo, en un momento dado, un objeto puede ser indefinible en términos de su clasificación o no como ser vivo. Para Mancin, la vaguedad en la aplicación de conceptos puede ser mejor comprendida si se comprende el contexto de su aplicación y se toma el tiempo como referencia. Por medio de una mejor concepción de tiempo, afirmó el ponente, es posible disminuir la ambigüedad al aplicar conceptos. Según la comentarista de Mancin, la profesora María Cerezo de la Universidad de Murcia, esta propuesta clarifica la importancia de la noción del tiempo

en la solución de las paradojas de la vaguedad, reforzando la negación de la vaguedad óptica y fortaleciendo la imprecisión de nuestras nociones de tiempo. No obstante, continuó la comentarista, hay problemas que requieren especial atención si se opta por este camino, como son el problema de la dirección del tiempo y de la naturaleza continua o discreta del mismo.

La última ponencia de este primer día de conferencias correspondió a Daniele Molinini, estudiante de doctorado de la Universidad de Paris 7 (Francia), y su "Using Numbers to Drive in Nails". Molinini trató la noción de 'explicación' en la filosofía de la ciencia y, más especialmente, en la filosofía de las matemáticas. Según el ponente, resulta relevante considerar esta noción, foco de atención de los filósofos de la ciencia, junto con la noción relacionada de 'energía explicativa', dado que ambas aparecen en varias y distintas discusiones y asuntos filosóficos contemporáneos, como la ontológica de la filosofía de las matemáticas, las aplicaciones de las matemáticas, las teorías de la comprensión científica, del modelo matemático, de la idealización, etc. Durante su ponencia, Molinini se interesó fundamentalmente sobre la noción, muy específica, de 'explicación matemática de los fenómenos físico'. La profesora Susana Berestovoy, de la Universidad de Paris I (Francia), fue la comentarista de esta charla.

La sesión del viernes 1 de octubre dio comienzo con la charla de Giulia Terzian, estudiante de doctorado de la Universidad de Bristol (Inglaterra). La autora inició su ponencia "Prospects for a Comparative Analysis of Set Theory and Semantics" presentando la tesis que aboga por la similitud estructural de las paradojas semánticas y conjunto-teóricas y, de ahí, también de sus soluciones. Según la ponente, dicha propuesta sería el producto de una tesis más general que defendería la similitud estructural de las propias teorías. La discusión de esta posible analogía fue la que ocupó entonces la atención de Terzian hasta el final de su charla.

Los comentarios que siguieron a la presentación estuvieron a cargo de la profesora Susana Berestovoy, de la Universidad de París I (Francia), quien planteó sus dudas acerca de la bondad de cualquier intento por establecer analogías entre la semántica y la teoría de conjuntos.

La segunda conferencia de la mañana correspondió a Dan Zeman, estudiante de doctorado de la Universidad de Barcelona, quien presentó una ponencia, en el marco de la filosofía del lenguaje, a la que dio el título de "Relativism and Binding: The Case of Predicates of Personal Taste". Zeman dedicó su charla a la discusión, en relación con los predicados de gusto personal (predicates of personal taste, PPTs), del reciente argumento de Jonathan Schaffer contra el relativismo. Según Zeman, se trata de un argumento paralelo al que concierne a la semántica de las oraciones meteorológicas, del tipo "está lloviendo", que aparece en la discusión entre la semántica veritativo-condicional y la pragmática veritativo-condicional. Zeman comenzó su charla aclarando la manera de utilizar los términos "contextualismo" y "relativismo", pasó entonces a introducir algunos ejemplos de predicados de gusto personal, y concluyó con una discusión que le permitió evitar la conclusión del *Binding Argument* de Schaffer en el caso de los PPTs. El comentarista de esta charla fue el profesor Fernando Martínez de la Universidad de Granada.

La última de las ponencias, que cerraba esta *Primera Conferencia de Graduados de la SLMFCE*, fue llevada a cabo por el Dr. Miguel Ángel Pérez Jiménez, de la Pontificia Universidad Javeriana de Bogotá, y se tituló "El lingualismo y la psicología del aprendizaje". En ella el autor partió analizando el 'lingualismo filosófico', en el que se niega que los animales no lingüísticos posean pensamientos, y el 'antilingualismo psicológico destructivo', en el que se mantiene que los animales no lingüísticos tienen pensamientos. El ponente se colocó en una posición intermedia, que él mismo denominó 'lingualismo triangular', señalando las deficiencias empíricas de las tesis

lingualistas al mismo tiempo que reconociendo las deficiencias conceptuales de las tesis antilingualistas. Su propuesta trata de superar los problemas de las dos posiciones anteriores incorporando en su argumentación la teoría de la atención conjunta. Tras discutir el modelo de Brinck, basado en la intencionalidad preconceptual, y ver lo inadecuado de este, Pérez abogó por la teoría experiencial-contemplativa de la atención conjunta como la adecuada para completar la posición lingualista. Durante el turno de la comentarista, la profesora Esther Romero de la Universidad de Granada, se debatieron varios aspectos del trabajo, especialmente hasta qué punto las tesis de Brinck se separan o no de la propuesta de Grice y, en consecuencia, hasta qué punto la crítica al primero podría o no conllevar una crítica al segundo.

Los organizadores de la *I Conferencia de Graduados de la SLMFCE*

CONTRIBUCIONES

Conventions: minimal, cultural and ultracultural

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In this essay I propose a new typology of conventions intended as an interpretative tool for the naturalistic study of behavior and society. I begin by reviewing now classical conceptions of what is a convention such as David Lewis'. Lewis considered coordination practices to lie at the heart of conventional behaviors. In this paper I will focus on this crucial aspect that makes conventional behavior so prevalent in human culture. Yet to start simple I will also consider Ruth Millikan's characterization of conventions as depicting a type of conventions that one can call « minimal ». In its most minimal version you do not even need coordination but simply reproduced patterns of behavior that generalize by weight of precedent. I argue that despite this characterization being too broad and all-encompassing, it illuminates the arbitrariness component of conventions. Thus « minimal conventions » may be of use in interpreting recent findings in the literature on culture in other primates. But minimal conventions appear as a “mind-free” characterization of the phenomenon that makes no reference to the epistemic and metarepresentational capacities of the agents. This, I will defend, is very unsatisfactory when attempting to formulate a theory of conventions. Other types of “mind-free” conventions are those resulting from certain game-theoretic evolutionary dynamics such as some examples in Brian Skyrms' treatment of the issue. These will have an important role to play in any interesting theory of convention but cannot claim to generality.

In phylogenetic respect, increased sociability and the cultural transmission of behavior introduce new ways of achieving coordination devices. A second type of conventions which I call « cultural conventions » may play a role in achieving such coordination. In its most simple versions you do not need sophisticated cognitive capacities. Exploring the ethological literature to observe this kind of conventions may be interesting in as much as it can give us some clues about the phylogenetic origins of conventional behavior. Evidence and controversies surrounding the appearance of stylistic function in artifacts may be illumi-

nating here too for under some interpretations the appearance of style is a mindless cultural convention and in other cases they are the expression of sophisticated group markers. Much of what makes many “mindblind” treatments of conventions so appealing (and useful!) is that they can account for a broad variety of cultural conventions. This in turn suffices to some extent to cover the classical philosophical interest in conventionality.

Advanced pragmatic capacities (involving metarepresentations) some of which are present since infancy-- may give rise to what I will call “ultracultural conventions”. The crux of ultracultural conventions are the expectations on others' behaviors and the motivational and emotional systems that push us to collaborate with others. Ultracultural conventions are possible with and without language as the literature on developmental psychology shows. In this way we can say with David Hume that “the actions of each of us have a reference to those of the other, and are performed upon the supposition, that something is to be performed on the other part”. The opposite is also true and is specially visible in infancy when intentional actions may be easily interpreted as communicative actions and communicative actions may be easily interpreted as ostensional thus portraying some form of conventional information. Human children readily acquire representations of the type “we do it this way”. Natural pedagogy, essentialism of linguistic form and ascriptions of function can be as well a mechanism to explain our rapidity in understanding situations as conventional. Anthropological evidence suggest that the emotions of shame and pride are further devices by which ultracultural conventions can become stabilized in the long run.

Normative conformity, the tendency to comply with others' behavior is discussed under this light. Ultracultural conventions are easily endowed with a certain normative force. Sometimes this happens by way of the *Normative Kraft des Faktischen*. Patterns that helped coordinate behavior provide advantages that we may not want to throw away. Other times people simply misfire. In fact we do so easily turn ourselves against those that do not respect regularities in behavior -- however harmless these “infractions” appear to be -- that the consideration that our cognitive system is tuned to detect these situations should be taken seriously.

El argumento de las trayectorias surrealistas y la carga teórica de la medición

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I. Introducción: el debate sobre las trayectorias surrealistas

En 1952, el físico D. Bohm desarrolla una teoría que da cuenta de los fenómenos cuánticos no relativistas basándose en una ontología de partículas, esto es, en un conjunto de puntos-masa cuyas posiciones y velocidades están bien definidas en todo instante (véase Bohm 1952). Puesto que, de acuerdo con la interpretación ortodoxa de la mecánica cuántica, la posición y la velocidad de una partícula *no* están simultáneamente bien definidas, la misma posibilidad de una teoría como la mecánica bohmiana debe ser particularmente bienvenida por todo aquél que pretenda considerar con rigor la rehabilitación de la noción de trayectoria en el dominio cuántico.

Sin embargo, en 1992 Englert, Scully, Süssmann y Walther [en adelante ESSW] sorprenden a la comunidad filosófica con un artículo en el que defienden que una interpretación realista de las trayectorias bohmanas es insostenible (véase Englert *et al.* 1992). Estos autores consideran un dispositivo experimental consistente en una partícula prueba que viaja a través de un interferómetro de dos brazos complementado con detectores de camino. En breve, el argumento de ESSW consiste en señalar que, en algunas circunstancias, la trayectoria que la mecánica bohmiana atribuye a la partícula prueba *no* coincide con lo indicado por los dispositivos detectores de camino. Los autores concluyen que las trayectorias bohmanas «no son reales sino *surrealistas*.» Este argumento, conocido como el «argumento de las trayectorias surrealistas» ha originado un intenso debate en la literatura que hoy día sigue vigente. (En adelante, para referirme a la circunstancia de que las trayectorias bohmanas no coinciden con las indicaciones de los detectores de camino, diré que se produce el «efecto» de las trayectorias surrealistas)

En el experimento analizado por ESSW, el detector de camino es una cavidad micromáser. En la literatura pueden encontrarse propuestas de ejemplificación del argumento de las trayectorias surrealistas que involucran otros dispositivos detectores de camino, como las de Dewdney *et al.* (1993), Brown *et al.* (1995) y Barrett (2000). Estos últimos autores están de acuerdo con

ESSW al considerar que las trayectorias bohmanas pueden diferir de las indicaciones de los detectores de camino; sin embargo, consideran que esto no implica que una interpretación realista de dichas trayectorias sea insostenible.

Recientemente, el debate de las trayectorias surrealistas ha dado un vuelco inesperado con los trabajos de Hiley y Callaghan (2006) [en adelante HC] y Hiley (2006). Al contrario de los autores anteriormente mencionados, HC defienden que si la interpretación de Bohm es correctamente aplicada las trayectorias derivadas no difieren en ningún caso de las indicaciones de los detectores de camino. Esto es, para HC no ha lugar a discutir las consecuencias filosóficas del efecto de las trayectorias surrealistas porque, sencillamente, éste no ocurre.

Así pues, el debate sobre las trayectorias surrealistas suscita dos cuestiones fundamentales. En primer lugar, deben investigarse las condiciones precisas de ocurrencia del efecto de las trayectorias surrealistas. Este análisis ha de permitir discernir entre la opinión de aquellos autores (como ESSW) que afirman que las trayectorias bohmanas pueden diferir de lo indicado por los detectores de camino y la aquellos autores (como HC) que lo niegan. En segundo lugar, debe elucidarse si el efecto de las trayectorias surrealistas supone o no una amenaza para el realismo bohmiano.

A continuación presentaré de modo sucinto algunas de las conclusiones de mi investigación doctoral en relación con estas dos cuestiones. En síntesis, cabe adelantar que estoy de acuerdo con ESSW en que la mecánica bohmiana sanciona, al menos como cuestión de principio, el efecto de las trayectorias surrealistas. Sin embargo, difiero de estos autores en relación con las consecuencias filosóficas de dicho efecto y argumentaré que éste es compatible con una interpretación realista de las trayectorias bohmanas y que la situación planteada ejemplifica de un modo novedoso y particularmente perspicuo el asunto de la carga teórica de medición.

2. Condiciones de ocurrencia del efecto de las trayectorias surrealistas

Asumiendo que las funciones de onda de la partícula prueba que se propagan por ambos brazos del interferómetro son simétricas y aplicando los postulados de la mecánica bohmiana, en mi tesis doctoral derivé la siguiente condición *suficiente* para la ocurrencia del efecto de las trayectorias surrealistas: (véase Solé 2009, p. 132 y ss.)

(SURRE) φ_{Si} y φ_{No} (las funciones de onda que representan los estados disparado y no disparado de los detectores de camino respectivamente) tienen soportes que se solapan en el espacio de configuración y las coordenadas del punto representativo del aparato, $S(t)$, son tales que $\varphi_{Si}(S(t)) = \varphi_{No}(S(t)) \neq 0$ para todo instante de tiempo t en que la partícula prueba se encuentra en la región de interferencia del interferómetro.

Puesto que en su trabajo de 2006, HC defienden que la mecánica bohmiana no sanciona el efecto de las trayectorias surrealistas en ningún caso, es obvio que dichos autores estarían en desacuerdo con un análisis como el anterior, del que se deduce la ocurrencia de dicho efecto si se satisface (SURRE).

Puede mostrarse, sin embargo, que la discrepancia entre las conclusiones de HC y las de mi propio análisis respecto de la ocurrencia del efecto de las trayectorias surrealistas se debe a que las trayectorias planteadas por HC son incompatibles con algunos de los postulados de la mecánica bohmiana. (véase Solé 2009, p. 191 y ss.) Más concretamente, puede mostrarse que, si la ecuación de Schrödinger tiene validez universal, la atribución de trayectorias planteada por HC implica que la posición y la función de onda *no* determinan por completo el estado de un sistema físico. Así, cabe concluir que HC desarticulan la objeción de las trayectorias surrealistas sólo a costa de emplear una interpretación de la mecánica bohmiana altamente revisionista y que no satisface todos los postulados que comúnmente se asocian con dicha teoría.

3. Discusión filosófica: el efecto de las trayectorias surrealistas y la carga teórica de la medición

Del hecho de que las trayectorias bohmianas no coinciden siempre con las indicaciones de los detectores de camino sólo se sigue la incorrección de dichas trayectorias si se considera que los detectores de camino son aparatos absolutamente fiables. Esta última premisa está desde luego implícita en el argumento de ESSW. Ahora bien, desde el punto de vista lógico, es igualmente legítimo considerar la otra alternativa del dilema y defender el realismo bohmiano renunciado a la asunción de que los detectores de camino son aparatos fiables. Así,

el realismo bohmiano es compatible con el efecto de las trayectorias surrealistas si se considera que los denominados «detectores de camino» *no* siempre detectan el camino seguido por la partícula prueba.

En consecuencia, pudiera parecer que la lección que cabe derivar del efecto de las trayectorias surrealistas es que el realismo bohmiano, al ser incompatible con la idea de que los detectores de camino son dispositivos fiables, es también incompatible con las teorías auxiliares en las que se fundamenta el funcionamiento de este tipo de aparatos. Sin lugar a dudas, esta incompatibilidad supondría un alto coste para el realista bohmiano, puesto que dichas teorías auxiliares han sido contrastadas de modo independiente y tienen un alto grado de corroboración. Por fortuna para el realista bohmiano, esta objeción es sólo aparente y a continuación mostraré que la mecánica bohmiana es compatible con las teorías auxiliares en las que se basa el funcionamiento de los detectores de camino.

Para ello, puede considerarse a modo de ejemplo el dispositivo experimental analizado por ESSW, que incluye una cavidad micromáser como detector de camino. En última instancia, el funcionamiento de este tipo de aparatos se basa en la teoría de la interacción fotón-electrón de acuerdo con la cual, siempre que una partícula convenientemente excitada se adentra en la cavidad, se produce un intercambio energético entre dicha partícula y la cavidad que redundará en la aparición de un «fotón chivato.» En adelante, me referiré a este mecanismo *local* de intercambio de energía entre la partícula prueba y el detector de camino como «Mecanismo I.»

Una cavidad micromáser será considerada como un detector de camino fiable, pues, en la medida en que la detección del fotón chivato permita inferir que la partícula prueba pasó por su interior. Ahora bien, debe notarse que para poder realizar dicha inferencia con garantía hay que aceptar, no sólo la teoría de la interacción fotón-electrón a la que acabo de referirme, sino una cláusula *ceteribus-paribus* adicional de acuerdo con la cual el Mecanismo I es el único proceso que, en el contexto considerado, puede redundar en la formación de un fotón chivato.

Mediante un análisis de un *gedankenexperiment* análogo al planteado por ESSW desde la perspectiva de la interpretación maximalista de la mecánica bohmiana, puede mostrarse que (i) siempre que la partícula prueba pasa por el interior de la cavidad se produce un intercambio energético local que redundará en la excitación de la cavidad, y (ii) lo que subyace al efecto de las trayectorias surrealistas es la transmisión *no local* de un cuanto

de energía entre la partícula prueba y el detector de camino. (véase Solé 2009, p. 152 y ss.)

De acuerdo con (i), la mecánica bohmiana sanciona el Mecanismo I sin excepción y, por tanto, es perfectamente compatible con las teorías auxiliares que subyacen al funcionamiento de los detectores de camino. Sin embargo –y de acuerdo con (ii)– la teoría sanciona un mecanismo alternativo no local de excitación del detector, que se produce cuando la partícula prueba está lejos del mismo. Por tanto, la incompatibilidad entre el realismo bohmiano y la fiabilidad de los detectores de camino *no* redundan en una incompatibilidad entre la mecánica bohmiana y las teorías auxiliares en las que se fundamenta la operación de los detectores de camino, sino en la incompatibilidad de la teoría con la cláusula *ceteris-paribus* anteriormente mencionada.

Acabo de argumentar que el efecto de las trayectorias surrealistas pone de manifiesto que, desde una perspectiva bohmiana, los aparatos usualmente denominados detectores «de camino» *no* miden siempre el camino seguido por la partícula prueba a través del interferómetro. Ahora bien, el hecho de que los detectores «de camino» midan el camino seguido por la partícula prueba no suele ponerse en duda en el contexto de la interpretación mecánico-cuántica ortodoxa. Así pues, nos encontramos ante dos teorías que arrojan veredictos disímiles respecto del desempeño de los detectores de camino y que interpretan de modo distinto los «hechos» arrojados por tales aparatos. El contraste entre ambos marcos teóricos a este respecto constituye, pues, un ejemplo novedoso y particularmente esclarecedor de uno de los asuntos más discutidos en la filosofía de la ciencia contemporánea, a saber, la cuestión de la carga teórica inherente en toda medición.

Mi análisis ha puesto de manifiesto, adicionalmente, que las herramientas conceptuales utilizadas de modo habitual en metodología de la ciencia para abordar el problema de la base empírica y de la contrastación de teorías son sumamente útiles también para evaluar el coste filosófico que el efecto de las trayectorias surrealistas supone para el realista bohmiano.

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Is anti-individualism trivial? – On the determinity and contentfulness of mental states

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The debates about the irreducibility of the vocabulary we use – or should use – to describe, and ultimately make intelligible, mental states and events are part of an ongoing controversy. Problems come out not only from the metaphysical question of clarifying exactly what to understand as 'mental state', but also related to strategic notions, among which we find that of normativity. Not that all psychological notions are normative in the same sense, but that those psychological states characterized by propositional attitudes make sense only in a normative space. Norms are then in one way or another taken to be the very other of nature: embedded in the context of social practices, where one can ascribe evaluative judgments of right or wrong to actions, norms get usually associated with the conceptual content involved in the economy of linguistic exchanges, the dynamics of production and consumption of speech acts. Framing the picture in this way, normativity is found on the core of a set of notions (language, reason, knowledge, etc) that typically played the role of marking the distinctiveness of humans among other animals, or as Brandom puts it, of what one refers to when she says 'we'.

Anyway, from this point of view, one gets the impression that we are still left with the traditional problem of filling the gap between mind and world: if nature is the realm of causes, and minds are in the realm of norms, how one actually bridges the transcendental abyss between them, finding an objective anchorage to the mental states? In the relevant sense of objectivity, the idea is to guarantee objective purport, or worldly content to states in the mind. Indeed, theories of perception revolve around the problem of providing conditions of possibility of an epistemologically successful experience of "getting things right", as John McDowell likes to put. As can be seen, even if not fully clear yet, the dramatical point is that one should but cannot expect to be submitted to a normative constraint coming from the world, at least as the latter is taken to be within the most commonly accepted philosophical grammar (the one we inherited after the modern process of 'disenchanting' of nature).

It may seem quite clear that the problem is bound to remain a conceptual trap unless one tries to reach a

different viewpoint on the issue, one that allows the presuppositions to go under careful scrutiny. As McDowell reiteratedly shows, one such presupposition that seems unjustified at a second glance is that the world cannot exert a normative, rational constraint over one's mental activity. Of course, challenging this point cannot be made without important changes in the philosophical grammar that supported that view. The same can be said about a different way of escaping the deadlock above mentioned: it consists in rejecting the substantialist conception underlying the dual opposition between mind and world. The main idea behind this line of thought is that what we call mind is the result of a process in which features of the world cannot be taken as an opposed strange object, but as the very material of which minds are constituted. In other words, the insight consists in an image of the mind not as a thing, but as a dynamic process the functioning of which would just be impossible if not supplied since its very beginning with contents that are objective. Put in more familiar terms, the thesis is that features external to the individual mind constitutively determine the content of her mental states; such a position is called anti-individualism (or externalism, which for the present purposes will be taken as strictly synonyms).

Under this label of anti-individualism there is not a consistent set of works developing one single idea, but a sort of heap of heterogeneous theories or positions that converge to some extent on the rejection that the content of mental states can be determined only by elements that are found beneath the skin of the individual. This negative characterization evidently does not show what external features such count as relevant to the determination of mental states; such features can typically be of two kinds: social or physical. Most of the effort then becomes finding ways of rendering the connections between the three poles intelligible.

Also, the issue of delineating what is labeled as anti-individualism concerning the nature of mental states has recently been accompanied by reflections about the place of such position in the history of philosophy, and not only, as is certainly more usual, in the debates of contemporary philosophy of mind. Traces of what is mainly understood as a rather recent position are sometimes shown to be at least announced in important moments of the philosophical cannon. For instance, Burge reverses the more intuitive way of characterizing anti-individualism defending that not just it is not an absolutely new position in philosophical discourse, but that anti-individualist insights are somewhat pervasive throughout the history of philosophy, or, more emphatically, that "anti-individualism is a

prominent, even dominant, view in the history of philosophy”.

The issue then becomes confusing enough to demand a careful reflection. How can anti-individualism be a dominant position in the history of philosophy when its paradigmatic opposite is taken to be Cartesianism, the very frame of thought from which almost every epistemologist tries to disentangle? No doubt some commonplaces about the philosophical canon shall not be maintained. As Burge shows, Descartes itself need not be the model individualist; some not neglectable aspects of his thought are anti-individualist in character. In fact, an anti-individualist character is discernible when there's appeal to some sort of meta-physical embeddedness, that is, in Burge's terms, when non-representational relations between mind and world play a decisive role in the representational content. In this sense, analogous considerations may be sound concerning Aristotelism, classical or contemporary empiricists, and others. Who, then, is anti-individualism confronting? According to Burge, the clearest individualists are those who emphatically privilege the first-person perspective, constructing mental activity exclusively with material immediately accessible to the eye of the mind; Burge name two representative individualists, even without further argumentation: Russell and Husserl.

However, a crucial question to any anti-individualist should be: is the position I am confronting really coherent? The answer to this question is involved in another, more fundamental one, namely, that do we have any unambiguous criteria to determine what to count as belonging to the 'individual' in the relevant sense? Can the expression 'beneath the skin' be such a criterion, for example? And even if it could be, how could one make it more precise? Searching in the topology of the cellular membranes?

The present conference will face these questions arguing that an strict individualist position is ultimately incoherent, at least if it does not incorporate the necessary ontological indetermination that marks the very concept of 'individual'. This means, among other things, to find some way to accommodate the epistemological paradox of the knowledge of the individual: either it is decomposed in its constitutive parts, and so the individual in itself is lost, or no knowledge of it is possible. Moreover, if individuals are taken to be a kind of epiphenomena, a mere assembly of manifold determinations, is there any interesting sense in which one can be anti-individualist? Or, in another words, if individualism is incoherent, does it follow that anti-

individualism is trivial? It will then be argued that it does not follow at least because one still needs to specify which external features play which roles in the determination of mental content. So, anti-individualism is not an empty intellectual enterprise. Nonetheless, anti-individualism seems to be the only epistemological viable position once the traps of substantialism are avoided.

The presentation will conclude reflecting on the following question: but what are we to do with this constitutive indetermination of mental states? Is this a sign of an unwanted irrationalism, since the individual knower cannot be fully self-transparent, have complete and immediate access to its psychological life? The best answer to this kind of accusation is found in important issues Wittgenstein addresses in his Remarks on the Philosophy of Psychology. There he will show how and why the psychological concepts carry with themselves a sort of constitutive indeterminacy that is just the expression of our forms of life. These considerations will throw some light on the issue, from which we started, of the irreducibility of mental vocabulary from a very different perspective, and possibly point to some other important consequences that non-substantialist categories of thought can have to other problems of the philosophy of mind.

Vagueness and Time

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In his paper *Vagueness and Endurance* (2005), E. J. Lowe tries to show that both endurantism and perdurantism can handle vagueness problems; that's because in Lowe's opinion they're basically equivalent. This means that the 3D and the 4D views don't present fundamentally different pictures of the metaphysics of persistence. The alleged differences among them are just a matter of how we describe the facts about persistence. In this way, says Lowe, we can face vagueness problems in a successful manner, without paying the ontological price of assuming the existence of temporal parts, and without going against the common sense view of persistence, as the perdurantist is forced to do.

Lowe argues in this direction developing a sort of "translation scheme" between the 4D and the 3D vocabulary, but this is not what we're concerned with now. What I'd like to underline, along with Lowe, is that the key assumption for the perdurantist is that it's impossible that:

(1): it's indeterminate what or how many objects exist at a given time.*

If we could make sense that vagueness is "in the world" – at least in some cases – then (1) would not be that problematic. But ontic vagueness is seen as absurd by the most part of philosophers. The assumption that (1) is false is supposed to favour the 4D view in a way we're not going to discuss here. What is important is to note the pivotal role of such assumption: *there can't be ontic vagueness in the sense that it's not possible that it's indeterminate how many objects there are at a given time in the world.*

Even in another important metaphysical debate this assumption has a decisive role: I'm thinking about restricted/unrestricted mereological composition (see Lewis, *On the Plurality of Worlds*, 1986). Here again the thesis that there can't be this kind of ontic vagueness is the base to demonstrate that the ordinary conception of objects must be rejected. The common sense view says that there are elements that compose an objects and elements that don't. In philosophy this is called the thesis of "Restricted Composition" (RC from now on). Lewis argues that the rejection of the kind of ontic vagueness we've spoken about drives us to reject also RC. This would turn out to be a defence of the thesis

of "Unrestricted Composition" (UC): given any n elements, these elements constitute an object. We're not going into the details of Lewis' arguments (which is taken and reshaped by Ted Sider in his book *Four-dimensionalism*, 2001); what is important to note here is the fundamental role played by the assumption that (1) can't be true.

Starting from this point, I want to focus on this assumption, considering a particular kind of objects: living beings. The reason is that these objects have a natural "evolution through time" (I use this expression in its common sense). This means that, at the beginning and at the end of the life of a living being X we have to deal with "periods of time" that don't have clear boundaries (if they have any); periods in which it is indeterminate whether they are living beings or not. Thus, we can reformulate (1) into:

(1'): it is indeterminate how many living beings exist at a given time

Thinking about the singular case of the object X , an object which is "coming into existence", we're driven to say that:

(2): it is indeterminate whether we can apply the predicate "living being" to X , during some periods of time

In other words, if we could demonstrate the plausibility of (1'), it would be sound to say that (2) mirrors in our language the fact expressed in (1'), which deals with how the world is.

The first thing to note, I think, is that in (1), (1') and (2) there is always a reference to the notion of time. One could say that this is just obvious, given that we're talking about "temporal ontic vagueness". Right. However, what I want to underline is that in the debate on vagueness and time the focus is almost every time on the language (the semantics, the application of the predicates, the sorites paradoxes...) or on the object (the identity criteria, the persistence criteria, the composition...).

Time, it seems to me, it's assumed to be just what it is, so to speak. It looks like the standard structure is always accepted. In other words, the topology which sees time as represented by a line made up by an ordered series of points, points that would stay for the following instants. Now let's take the beginning of a life: we have to face an apparently indefinite period of time in which, "for a while", it looks like it's indeterminate

whether we can count the object X (an object coming into existence) as a living being or not. That is, we're not sure if we can apply the predicate "living being" to X.

As it's often said, this apparent indeterminacy can have an epistemic, semantic or ontic source. I'd like to investigate a peculiar formulation of this last case. Indeed, I want to focus on the hypothesis that the vagueness emerging from some indeterminate cases of application of the predicate "to be a living being" reflects an indeterminacy in the world and some of its objects. I mean, an indeterminacy caused by our notion of time.

As I've noticed before, in treating the relation between vagueness and time, the structure of time is assumed to be the standard one (i.e. what we're calling the "topology of the line"). There are many reasons to go this way. First of all, common sense. I don't mean that matching the common sense view is always a decisive argument in a philosophical debate, but we have to say that this perspective about time looks very pervasive and also "palatable" for our ordinary knowledge and beliefs. Moreover, as Fred Van Oystaeyen pointed out (see for example *Virtual Topology and Functor Geometry*, 2008), even the ordinary use of the "before-than" relation and the common "cause-effect" notion seem to indicate that the topology of the line is the correct one. But these, in the end, are not decisive arguments for adopting this kind of ontology of time (i.e. time as an ordered series of singular instants). Of course, to reject this perspective, we would need to explain why we should go with an account of time which could go against the good-looking and useful standard view.

But what I'd like to stress here is that it's of pivotal importance to state which kind of metaphysical/physical idea of time we choose to adopt (or, in a stronger sense, we hold to be true).

The condition for all the debates we've outlined before (the truth or falsity of (1), the 3D/4D and the RC/UC disputes, the investigation of the relation, in some cases, between vagueness and time) to be run as they are, is the following:

(3): time must be conceived as representable by a line composed by a succession of points, where the points stay for the different instants of time.

This is the only way in which we could single out one instant, the only way to identify it. And this can give

rise to the problem of vagueness. In fact, we then have borderline cases of application of predicates, soritical paradoxes, indefinite boundaries and so on. But if, briefly speaking, the topology of the line doesn't hold, then these problems would turn out to be misleading and in need of a reformulation. In this sense I speak of an ontic hypothesis on the nature of vagueness related to the notion of time. What the structure of time is like (an only partially ordered set? A branching line? A sort of lattice? Is it *gunky*?) is the question I think we should try to clarify before facing the one about vagueness. In the end, this hypothesis could turn out to be a defence of the idea that it is indeterminate how many living beings there are in the world, versus the assumption that (1) is false. If the hypothesis turns out to be plausible, this would imply that in some periods of time it's indeterminate whether an entity X is a living being (and can be counted as such) or not.

If this was the case then, first of all, we would need to concentrate on the notion of "periods of time".

Secondly, we should focus on the idea of count-indeterminacy; the fact that "during some time" we're not sure if to count X as a living being or not doesn't mean that out there there's nothing at all. Rather, there is something (call it Y) to which we are not able to apply the predicate "living being". But this idea could become very risky.

Thirdly, if this was a plausible explication of the vagueness we experience when talking about living beings, then we should reflect on how to deal with this kind of vagueness.

Finally, we should review the arguments that take the absurdity of (1) as an assumption, such as those outlined in the beginning.

*Every time I write "it's indeterminate..." I mean that it's *apparently* indeterminate.

Using Numbers to Drive in Nails

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The notion of “explanation” has received a renewed attention among philosophers (and philosophies!) of science. This is particularly evident if we consider how “explanation”, together with the related notion of “explanatory power”, appears as an essential ingredient in various and distinct contemporary philosophical debates and topics: ontological arena in philosophy of mathematics (Enhanced Indispensability Argument), applicability of mathematics, theories of scientific understanding, mathematical modelling, idealization, etc. In this paper I focus on the very specific notion of mathematical explanation of physical phenomena (henceforth MEPP). As Paolo Mancosu has put it in one of his comprehensive studies on explanation, MEPP refers to “explanations in the natural sciences where various mathematical facts play an essential role in the explanation provided” (Mancosu 2008). It is generally recognized that traditional theories of scientific explanation have troubles when faced with MEPP. In some cases these theories left apart mathematical explanations and did not consider them (Hempel’s D-N model, Van Fraassen’s Pragmatic Account or Causal Models of scientific explanation such as Salmon’s or Dowe’s); in other cases those accounts had the ambition to cover mathematical explanation as well within their general framework but were subjected to strong criticisms (this is the case, for instance, of Kitcher’s Unificationist model). However, the recent interest on MEPP was not only a consequence of this “embarrassment” for the philosophy of science. Two other main factors contributed to its study, particularly in the area of philosophy of mathematics: the increased interactions between mathematics and natural sciences (Urquhart 2008); the emergence of “new directions” in the philosophy of mathematics, which gave more attention to the mathematical practice itself (Aspray and Kitcher 1988, Tymoczko 1998).

A traditional trend towards scientific explanation was aimed to capture the notion by providing a global model, i.e. a model which aim was to define explanation *simpliciter*, often recurring to some logical machinery (call this approach the *Winner-take-all* approach to explanation). However, the contemporary attitude is to go “Pluralist” and consider that explanations are relative to the context dependent why-

questions they answer. This pluralist attitude is considered to better mirror the usage of “explanation” in scientific practice and is regarded as a more flexible instrument to investigate the different uses scientists make of it in different domains (for instance, in Biology, Physics, Economics). Leaving apart ontological questions and mysteries about the applicability of mathematics (Eugene Wigner’s famous “unreasonable effectiveness of mathematics in the natural sciences”), some authors agree that it is possible to have a better comprehension of MEPP starting from general discussions of scientific explanation and focusing on particular case-studies (Baker 2005, Lyon and Colyvan 2008, Mancosu 2008, Batterman 2010). In this paper I will follow this line: I will not endorse any “a priori” specific model of explanation, but I will get my hands dirty via a bottom-up approach that starts from the scientific practice itself.

The work is structured along two different theses. In the first part I defend the idea that the *Pluralist-is-better* attitude should be considered as the most promising way for investigating MEPP: the Pluralist position better accounts for our contemporary scientific practice, and offers new interesting directions of analysis. In the second part, which constitutes the core of the paper, I propose my original approach to MEPP. In particular, I propose a way to account for the gap in explanatory potential between two MEPPs of the *same* physical phenomena in the same scientific context. I introduce my framework of Conceptual Resources and Conceptual Tools and illustrate it with an example. Finally, I show how this approach is compatible with the Pluralist hypothesis and what is the payoff of adopting it.

To the Pluralist position on MEPP there corresponds a bottom-up methodology, i.e. a methodology that takes the case studies themselves as starting point for philosophical analysis. My claim is that this practice-driven strategy better mirrors what scientists consider as MEPP in their practice, while the Winner-take-all conceptions of explanation we have at disposal do not provide such a possibility (at least if we take the work of scientists seriously, which is what I assume as a basic premise of my investigation). In order to support this claim, I will propose a case which is recognized as MEPP in contemporary scientific practice (the behaviour of Hénon-Heiles system explained through the phase-space formalism) but which cannot be accounted by the contemporary three major Winner-take-all conceptions of explanation (Steiner’s model, Kitcher’s and Van Fraassen’s).

As a consequence, even if we assume that they work for the particular test-cases for which they were designed, the global accounts are able to capture only particular instances of MEPP and Pluralist seems to be the more promising way (at least for what the contemporary studies suggest) to the study of MEPP. Furthermore, I will point out to one interesting implication of adopting such a position, namely, the ontological commitment a Pluralist partisan must adopt. I qualify an account of explanation as “ontic” when it is based on a relation that is characterized independently from the categories linked with the subject who knows (Hempel’s D-N model is an example of ontic model); on the other hand, I call “epistemic” an account which uses a relation which is defined through categories, such as the “understanding”, which are linked to the subject (Van Fraassen’s model or Batterman’s provide an example of this). By focusing on two Pluralist’s views on MEPP, and in particular on Batterman’s Asymptotic Explanation and Pincock’s Abstract Explanations, I will show how Pluralism is neutral towards the ontic-epistemic commitment. To put it in other words: the Club of Pluralists can equally admit as guests ontic as well as epistemic accounts of MEPP.

If we agree that Pluralism is the more promising way, our methodology must necessarily go in the bottom-up direction (practice-driven strategy). In the second part of my paper, starting from the framework proposed by Henk De Regt and Dennis Dieks (2005), I present my own approach to MEPP in terms of Conceptual Tools and Conceptual Resources. In their paper on scientific understanding, De Regt and Dieks suggest to consider causality, visualization and unification as examples of intelligibility standards that vary through history and depend on the specific meso-level scientific context in which they are employed (where the meso-level scientific context is the context of scientific communities in a specific historical period). They go on by proposing that intelligibility standards are context-dependent *conceptual tools* for achieving understanding. More precisely, De Regt and Dieks’ idea is that those tools permit the intelligibility of a scientific theory by making possible the circumvention of a calculatory stage and the direct jump to a conclusion which concerns qualitative characteristic consequences of the theory itself (CIT: Criterion for the Intelligibility of Theories). For instance, the visual picture of a gas as a collection of freely moving molecules in a container permits to recognise qualitative consequences of the kinetic theory. In my analysis I discuss the use of the conceptual tools of Visualization and Abstract Reasoning in mathematics, and not in empirical theories. My claim is that conceptual tools are vectors of *conceptual resources* in MEPP, where the conceptual resources depend on the par-

ticular situation under study. When faced with two mathematical explanations of the *same* phenomenon, we can evaluate the explanatory potential by weighting the conceptual resources that come into play (through conceptual tools). This evaluation, as I later show with an example, accounts for the sense of explanatoriness that is attributed to a particular MEPP in scientific practice. Conceptual tools are then epistemic utilities through which we employ our conceptual resources (and, implicitly, our background knowledge which is context-dependent and varies over time and scientific communities). To illustrate intuitively the notions of conceptual tools and conceptual resources I will start by reconsidering the classical Asymmetry Problem of scientific explanation. The well-known example is that of the flagpole and the shadow. If we consider a flagpole and its shadow, by using the laws of optics together with the laws of trigonometry and some physical assumptions we can explain why the shadow has that particular length by considering the length of the flagpole. Now, while the deduction is perfectly legitimate via the same laws the other way around (deduce the length of the flagpole from that of the shadow), it seems a nonsense to say that the length of the shadow *explains* the height of the flagpole. Observe that trigonometrical laws do not permit to choose one direction as preferable, and then they do not discriminate the choice of the preferred explanation. Thus, in order to solve the Problem of Asymmetry (i.e. in order to pick up what is generally considered as the explanatory direction), we need something else. What I want to stress in the example is that we can solve the Asymmetry Problem because we dispose of (or we lack, in the other symmetric case) an extra conceptual tool (Causal Reasoning), and this tool is a vector of Conceptual Resources (light rays travel in straight paths; sun emits light; the shadow “appears” when there is an object between a source of rays and the ground). Conceptual resources belong to our scientific “baggage”, and we use conceptual tools as our epistemic instrument. After all, the possibility to reason intuitively in terms of some methodologically basic concepts is what emerges from mathematical and scientific practice (Tappenden 2005).

In the last part of the paper, I show with a case study how the use of conceptual resources and conceptual tools permits to evaluate the explanatory power of MEPPs without endorsing any specific model of explanation. In particular, I consider the case of Hénon-Heiles systems where, when faced with two mathematical explanations of the same phenomenon (the behaviour of a particle in a bi-dimensional potential), we can evaluate the explanatory potential by weighting the conceptual resources which come into play (through the conceptual tool of Visualization).

This evaluation reflects the intuition of scientists who consider one explanation as more powerful than other. In the case of Hénon-Heiles systems, the explanation which uses the Hamiltonian formalism is recognized by scientists as having more explanatory power than the Lagrangian explanation. This explanatory gain must be attributed to the use of more (mathematical) conceptual resources (phase-space structure, Poincaré map) through the tool of Visualization. We take a 2-dimensional cross section of this hypersurface in the phase space and then we map the intersections of the trajectories with the plane by using the function called Poincaré Map. Then we look at the “dots” made by the solutions (trajectories) on the Poincaré section and we can visually grasp qualitative information about the regular or chaotic dynamics of the system. Thus Visualization permits to infer qualitative conclusions about the behaviour of the system without any calculation (at some particular step in the reasoning).

To conclude, I sketch the “ontological” payoff of adopting such an approach. Some philosophers committed to the existential attitude (notably, Mark Colyvan and Alan Baker) have attempted to show the existence of mathematical objects by the so-called “Enhanced Indispensability Argument” (they refer to the indispensable explanatory power of mathematics in scientific theories as an instrument to support the claim that some mathematical objects exist). However, there exists a strong critical attitude towards this use of the notion of explanatory power. Other authors consider that the explanatory power of mathematics could not be used in such existential inference and that the explanatory utility of a mathematical model does not depend upon the actual existence of the mathematical objects posited by the model (Leng 2005, Bangu 2008). My approach to MEPP strongly supports the latter view because the characterization of explanatory power I propose is pragmatically defined and then cannot be used in such a realist inference. To use causality as heuristic device in the Asymmetry Problem does not entail that we have a theory of Causality or even that a principle of causality governs the world at some fundamental level. To use some mathematical tools and concepts (rather than others) to explain the world amounts to use a hammer rather than a table or our hands, to drive in a nail.

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Prospects for a Comparative Analysis of Set Theory and Semantics

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The point of departure of this paper is F.P. Ramsey's claim that the set-theoretic and the semantic paradoxes (and the respective disciplines) should be studied separately¹. Against this thesis, G. Priest² among others notably champions a 'principle of uniform solution' for both kinds of paradoxes.

The state of the art, however, indicates that the two disciplines are at odds, in this respect: in set theory, but not semantics, solution to the paradoxes and successful formalism converge – in the ZF axioms.

A structural similarity at the theory level can be traced in the naïve versions of set theory and semantics, which simultaneously satisfy the following:

(1) The language L of the theory has the syntactical resources to allow self-reference.

(2) Classical logic is assumed to hold.

(3) The following unrestricted axiom schemes are assumed as basic principles of set theory and semantics (respectively): for ϕ any formula of the respective languages,

(CA) $\exists x \forall y (y \in x \leftrightarrow \phi[y])$

(TA) $\text{True}(\ulcorner \phi \urcorner) \leftrightarrow \phi$.

Restricting the possible instantiations of ϕ in (CA) marks the transition to a consistent theory of sets; attempts to restrict (TA) have not (yet) been similarly successful.

In this paper I argue that the thesis of the structural similarity of the paradoxes and their solutions supervenes on a more general thesis, concerning the structural similarity between the respective theories.

Thus the specific question of whether set theory can be informative for semantics turns on the soundness of the following Analogy Argument:

(Par) The set-theoretic and semantic paradoxes have the same structure.

(ZF) The set-theoretic paradoxes are solved by ZF set theory.

(Norm) The theories of sets and truth follow the same *underlying norms*.

\therefore

(Sol) Any solution to the semantic paradoxes should have the same structure as ZF set theory.

The rest of the paper investigates whether (Norm) is a sound premise.

The literature points to two principles as the fundamental underlying constraints of the ZF axioms, namely the *iterative conception* (IT) and the *limitation of size conception* (LIM). The key aim is then to evaluate whether any relevant semantic principles can be found to correspond to the set-theoretic ones. The iterative conception encapsulates a great deal of information about the construction of the set-theoretic universe; in particular, it tells us that any two levels of the set-theoretic hierarchy stand in a well-defined *dependence* relation, represented by the membership sign \in .

Thinking of dependence makes the analogy seem within reach, since this notion has received much attention in semantics. The paper focuses on the account developed by H. Leitgeb³, which construes dependence as a form of supervenience of the truth value of sentences of L on the extension of the truth predicate.

Finding a semantic counterpart to LIM is trickier: here too a few options are explored, with mixed results. One of the more promising among these derives from identifying quantifier ranges (of the sentences of L) as the object of the semantic constraint. This leads quite naturally to draw on some of the arguments against absolutely unrestricted quantification in semantics⁴.

In the last part of the paper I advance two further suggestions to run the Analogy Argument, by modifying the second premise. The first option results from replacing (Norm) by

(Ref) The theories of sets and truth prove reflection principles of the same form.

In set theory, reflection principles are extremely fruitful meta-theoretic tools for settling certain propositions (about the set-theoretic hierarchy) that could otherwise not be directly derived from the ZF axioms.

Reflection principles are also objects of interest in connection to truth, for instance in the context of the debate about the deflationary nature of truth.

Ultimately, it emerges that set-theoretic and truth-theoretic reflection principles are dissimilar under certain important respects – such as their role as soundness principles for the respective underlying theories.

Finally, I discuss the third version of the Analogy Account, which results from replacing (Norm) by

(Abs) The theories of sets and truth have abstraction principles of the same form.

Ultimately, it emerges that nowhere does the analogy completely go through; this negative result is in part counterbalanced with some suggestions for further directions of research.

1. Ramsey, F. P., *The foundations of mathematics*, 1925; in Braithwaite (ed.), *The Foundations of Mathematics and Other Logical Essays*, by Frank Plumpton Ramsey., London: Routledge Kegan Paul, 1931.

2. Priest, G., The structure of the paradoxes of self-reference, *Mind*, 103:25-34, 1994.

3. Leitgeb, H., What truth depends on, *Journal of Philosophical Logic*, 34(2), 2005.

4. Cf. for example the articles by Linnebo, Ø. and Williamson, T. in Rayo, A. and Uzquiano, G.(eds.), *Absolute Generality*

Relativism and Binding: The Case of Predicates of Personal Taste

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The main concern of the paper is one argument that has recently surfaced in the debate between contextualism and relativism about predicates of personal taste (PPTs), argument that parallels the one found in the debate between truth-conditional semantics and truth-conditional pragmatics concerning the semantics of meteorological sentences such as “It is raining”.

In the first section I make clear how I’m going to use the terms “contextualism” and “relativism”, which given the multiplicity of positions and the different uses those two terms have received, seems a reasonable thing to start with. Thus, I use the term “contextualism” for any view in which context has a *content-determinative* role (in the terms of MacFarlane (2009)) and the term “relativism” for any view according to which context has a *circumstance-determinative* role. (Here “content” and “circumstance” have the same meaning they have in Kaplan (1989).)

Section 2 introduces predicates of personal taste and presents an argument against relativism recently put forward by Jonathan Schaffer (forthcoming). PPTs – expressions such as “tasty”, “fun”, “disgusting”, “sexy”, “cool”, etc. – have been one of the areas in which the debate between contextualism and relativism has been carried with particular insistence. The issue of interest here is what arguments could be brought in support of any of these views. Usually, the debate has revolved around alleged cases of “faultless disagreement”. However, Schaffer (forthcoming) has recently proposed a different argument against relativism and in favor of contextualism. Schaffer starts from the observation that PPTs can be bound. A sentence like

Everyone got something tasty.

has a reading according to which what each of the people in the domain of “everyone” got something tasty *for that person*. Schaffer then claims that the best explanation for this reading, and for making sense of the contrast between (1) and a sentence like “Everyone got something frozen” is to posit a hidden variable for the judge at the logical form. Thus, on Schaffer’s view, (1) is to be rendered as $\text{Everyone}_i \text{ got something tasty for } x_i$. This, in turn, has the consequence that “tasty” in itself has an argument place for the judge that when not explicitly

mentioned is provided by context.

Section 3 draws the parallel between the argument above and the argument employed by Jason Stanley (2000) in order to argue in favor of truth-conditional semantic approaches to sentences like “It is raining” – an argument known as the Binding Argument. Stanley also starts with the observation that

(2) Every time John lights a cigarette, it is raining,

has a reading according to which the location of rain is bound by the quantifier “every time John lights a cigarette”; that is, the truth-conditions for (2) are that for every time t that John lights a cigarette it is raining at t at the location in which John lights a cigarette at t . Stanley claims that the truth-conditional pragmatic approach cannot deliver this reading, since the theoretical resources of the view are too poor. But more importantly in this context, Stanley claims that once it has been established that the location of rain must be part of the logical form of (2), it also must be part of the logical form of the unembedded sentence “It is raining”.

Now, Stanley’s Binding Argument was designed against truth-conditional pragmatics, but it is important to note that it equally works against relativism about locations. For, if correct, its conclusion will compel us to posit an argument place for locations in simple sentences such as “It is raining”. Since on the relativist view as I understand it in this paper, locations are not part of the content of simple sentences such as “It is raining” (and, hence, not part of their logical form), any argument to the effect that locations must be part of their logical form should be addressed. This also seems to be the reasoning behind Schaffer’s argument presented in the case of PPTs.

Section 4 surveys a number of answers to the Binding Argument that try to escape its conclusion. The first proposal I consider is Peter Pagin’s (2005), who has offered a solution to avoid the conclusion of the Binding Argument for locations that is compatible with the pragmatist approach. Pagin’s proposal is to render the bound reading of (2) by quantification over contexts in the meta-language instead of quantification over locations in the object-language. An expression like “Every time”^Λs will thus be rendered in Pagin’s system as

“Every time”^Λs is true at c iff for every context $c' \approx ct + l$, s is true at c' ,

where “^Λ” is the concatenation sign, s is a sentence, and $c' \approx ct + l$ is to be read as “context c' differs from

context c only with respect to the time and location parameters”. (2) is rendered as

“Every time”^Λ “if John lights a cigarette, then it rains” is true in c iff for every context $c' \approx ct + l$, if John lights a cigarette at $T(c')$ at $L(c')$, then it rains at $T(c')$ at $L(c')$

which gives the desired reading. As can be easily seen, on this account no variable for location needs to be postulated in the logical form of the simple sentence “It is raining”.

In response to this strategy, however, Stanley (2005) has provided some examples that are problematic for Pagin’s view, the main complaint being that in those cases the things that need to be quantified over are not the right things to be contexts. Although I don’t fully agree with Stanley’s diagnosis of the cases, I nevertheless argue that Pagin’s attempted solution to the problem raised is unsatisfactory. The second answer to the Binding Argument that I survey is that given by Peter Lasersohn (2008): quantification over indices. Lasersohn conducts the discussion in connection with an example similar to (1), but the same strategy applies to (2) as well. Thus, in Lasersohn’s system the quantifier “everyone” introduces both a pronominal element in the syntax (pro1) and a sentence-abstract-forming operator that binds the index in the metalanguage ($\mu 1$). Thus, (1) will be rendered as

[[[everyone] $\mu 1$ [[something] $\lambda 2$ [pro2 is-tasty] $\lambda 3$ [pro1 [got pro3]]]]].

I have much sympathy for Lasersohn’s view, but there is a problem with one prediction that follows from Lasersohn’s system, which is that in

(3) Each man gave a woman a fun ride and a tasty dish

there is no reading according to which the judge associated with “fun” and the one associated with “tasty” are different persons. In the paper I construct a scenario in which precisely such a reading seems to be the intuitive one. Thus, the fact that this prediction about (3) is born out in Lasersohn’s system doesn’t speak in its favor.

The last answer to the Binding Argument I consider, and the one I take to be correct is that of François Recanati (2002), consisting in appealing to variadic functions. Variadic functions are functions from predicates to predicates having the role of decreasing or increasing the adicity of the input predicate.

Technically speaking, the treatment involves defining a general variadic operator, **Circ**, and a host of specific operators of the same kind, for specific circumstances (location, time, etc.). Variadic operators are of two kinds: additive and recessive. What we need for our purposes are additive variadic operators. Additive variadic operators have a twofold role: on one hand, they increase the adicity of the predicate they operate on; on the other, they provide a value for the newly-created argument place.

Let us see how this works with a concrete example. In the sentence “John eats in Paris”, the phrase “in Paris” is treated as a additive locational variadic operator operating on the predicate “eat”, transforming it from a one-place predicate into a two-place predicate; formally,

[**Circ** location: Paris (eats)] (John) = eats_in (John, Paris).

The twofold effect of the variadic operator is easily seen: on one hand, it increases the adicity of the predicate applied to (“eat”); on the other, it provides the value for the newly-created argument place (the value in this case being “Paris”).

Now, in answering the challenge posed by Stanley, the suggestion is to treat quantifiers on a par with expressions like “in Paris”, as additive variadic operators. Before getting to the problematic case, let us see how this works in a simpler case, the sentence “Everywhere I go, it rains”. In this sentence the expression “everywhere I go” is treated as an additive locational variadic operator, functioning similarly to “in Paris” in the case before (with the notable difference that instead of providing a *specific* location as the value for the newly-created argument place, it provide a *range* of locations):

Circ location: everywhere I go (rain) = rain_in (everywhere I go)

Returning to the problematic sentence (2), the treatment will be more complex, but the basic mechanism is the same. The complexity comes from the fact that the expression “every time John lights a cigarette” binds both the time and the location of the raining. Recanati’s favorite treatment of the case is to claim that the expression “every time John lights a cigarette” should be treated both as an additive temporal variadic operator (which is articulated), and as an additive locational variadic operator (which is unarticulated) – the first creating an extra argument place for times in the predicate it applies to (“rain”) and then binding it, and the second creat-

ing an extra argument place for locations in the predicate it applies to (again, “rain”) and then binding it. Leaving aside the temporal case, the important idea here is that “every time John lights a cigarette” is treated as an additive locational variadic operator which functions in a similar fashion to “in Paris” and “everywhere I go”. The effect of the locational variadic operator can be represented as follows:

Circ location: every time John lights a cigarette (rain) = rain_in (the place at which John lights a cigarette every time),

The upshot is thus that the employment of variadic operators allows Recanati to resist the conclusion of the Binding Argument.

Section 5 applies the apparatus of variadic functions to PPTs and to Schaffer’s argument. The move to be made in order to account for (1) is similar to Recanati’s answer in the case of (2). What needs to be done is to define a specific additive variadic operator – call it a *subjectual* variadic operator – that would account for the semantic behavior of expressions like “for x”, where x is the judge. Thus, in a sentence like “Avocado is tasty for John”, the expression “for John” is treated as an additive subjectual variadic operator which functions as follows:

[**Circ** subject: John (tasty)] (avocado) = tasty_for (avocado, John).

Moving to the problematic example (1), the relativist will treat the expression “everyone” as an additive subjectual variadic operator, which functions similarly to “for John” (with the notable difference, again, that it is not specific judges that are provided as values for the newly-created argument, but a range of judges):

[**Circ** subject: everyone (tasty)] (something) = tasty_for (something, everyone).

This strategy thus accounts for the required readings of the problematic example (1) and renders unembedded sentences comprising “tasty” as not having an argument place for the judge in their logical form. The conclusion of the Schaffer’s Binding Argument for PPTs is thus avoided.

In the last section I present some possible objections to the variadic functions strategy (that it is ad-hoc, that it makes the view contextualist, and that it doesn’t solve “the projection problem”) and offer some answers.

El lingualismo y la psicología del aprendizaje

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El tema de esta ponencia son las relaciones entre el pensamiento y el lenguaje. En ella se defiende una tesis a contracorriente. Su objetivo es indicar la plausibilidad psicológica empírica de una tesis filosófica que suele desacreditarse con base en argumentos provenientes, precisamente, de la psicología empírica: el lingualismo.

Nuestra defensa psicológica empírica del lingualismo depende de dos estrategias básicas. En primer lugar, de una consideración filosófica: los conceptos empleados para hablar del pensamiento deben estar definidos con la mayor claridad posible. Esta es una labor ya desarrollada ampliamente en la bibliografía filosófica. En segundo lugar, de una consideración psicológica empírica: la articulación al lingualismo de una teoría psicológica empíricamente sostenible debe ser compatible con las exigencias conceptuales planteadas por la filosofía. Esta última empresa está todavía por realizar y es a la que queremos contribuir modestamente con esta ponencia.

Lingualismo filosófico

Hans-Johann Glock introdujo el término ‘lingualismo’ para referirse genéricamente a las posiciones teóricas que “niegan que los animales no lingüísticos tengan pensamientos” (2009, 74). Por lo general, el lingualismo es una tesis proveniente de la filosofía, del análisis conceptual de los conceptos psicológicos, por eso hablaremos de él como “lingualismo filosófico”.

El lingualismo filosófico fuerza a cortar el pastel de la filogenia de un modo curioso. *Prima facie*, según la clásica formulación de Espinosa, “el hombre piensa”. En este sentido, el continuo filogenético animal se fractura precisamente en el hombre, el animal al que le está reservado el pensamiento. Para los lingualistas la historia es diferente. El hombre piensa siempre y cuando tenga lenguaje; por lo tanto, el continuo filogenético animal se fractura en un punto distinto. El pensamiento está reservado para los animales lingüísticos, luego los animales humanos carentes de lenguaje, ejemplarmente los bebés, quedarían por fuera del reino del pensamiento.

Según lo dicho, las posiciones lingualistas toman parti-

do tanto en el debate sobre el pensamiento animal en general, como en el debate sobre el pensamiento infantil: el lingualismo es una tesis tanto filogenética como ontogenética. Glock (2009) se ocupó del lingualismo como tesis filogenética. Su interés era el pensamiento animal en general. En este trabajo nos ocupamos de la cara ontogenética del lingualismo. Así entendida, la tesis lingualista dice que sólo los seres humanos con lenguaje tienen pensamientos y que sólo los seres que tienen pensamientos tienen lenguaje. Dicho brevemente, el lingualismo es la tesis según la cual el lenguaje es una condición necesaria y suficiente para el pensamiento; para decirlo en la clásica formulación de Davidson: “hay una dependencia mutua entre el pensamiento y el lenguaje” (2001, 17). Dos corolarios ontogenéticos de esta tesis son que los niños preverbiales no tienen pensamientos y que es imposible que una criatura sin pensamientos pueda ser un hablante.

Antilingualismo psicológico

Distintos teóricos han señalado que la tesis filosófica lingualista es psicológicamente implausible (Andrews 2006; Newen et al. 2007; Weiskopf 2008). Es claro que muchos animales y los niños preverbiales tienen pensamientos, nos dicen, y también que puede haber seres humanos lingüísticos que carecen de pensamientos: los autistas de alto desempeño. Estas dos objeciones psicológicas al lingualismo motivan, a su vez, dos tipos de actitudes. Por un lado estaría el “antilingualismo psicológico destructivo”, que considera que *el lingualismo filosófico es una posición teórica absurda*. Por otro, está el “antilingualismo psicológico constructivo” según el cual *el lingualismo es una posición teórica deficiente*, pero susceptible de corrección y mejoramiento con ayuda de la psicología empírica. Los teóricos que asumen esta segunda posición suelen tener una actitud conciliadora que tiende a hermanar los esfuerzos del análisis filosófico conceptual y la psicología empírica.

Crítica al antilingualismo psicológico

La defensa del lingualismo que desarrollamos en esta ponencia presenta argumentos de tipo conceptual contra el antilingualismo psicológico destructivo. Las afirmaciones que alegan el absurdo psicológico de negar el pensamiento preverbal presentan fallos importantes a la hora de definir estrictamente los conceptos psicológicos.

Para enfrentar el antilingualismo psicológico constructivo asumimos otra estrategia. Empezamos consideran

do la hipótesis introducida recientemente, y de creciente popularidad, según la cual la teoría psicológica del aprendizaje por atención conjunta complementa y corrige las deficiencias de los corolarios ontogenéticos de la tesis lingualista tal como se expresa en la analogía davidsoniana de la triangulación (Modée 2000, Brinck 2004, Eilan 2005, Martínez 2006, Miguens 2006). Sin embargo, no seguimos la hipótesis común de que la atención conjunta es una teoría psicológica empírica que complementa y corrige la tesis de la triangulación. La razón de ello es que la teoría del aprendizaje por atención conjunta está dominada por un modelo muy problemático, que llamaremos *teoría de la intención pre-conceptual para la atención conjunta* (Brinck 2004; Tomasello 1998, Tomasello et al. 2005). Según este modelo, la atención conjunta funciona estructuralmente del mismo modo que el reconocimiento iterado de intenciones que Grice describió magistralmente. Pero, a diferencia del modelo intencional de Grice, la atención conjunta funciona sin necesidad de que los agentes que prestan atención posean conceptos.

Lingualismo filosófico psicológicamente plausible

En oposición a las teorías griceanas para la atención conjunta, defendemos que el lingualismo propio de la triangulación es plausible desde una teoría psicológica del aprendizaje diferente, poco común, que llamamos *teoría experiencial-contemplativa para la atención conjunta* (Hobson 1993, 2002; Reddy 2005, 2008). Para esta teoría, los mecanismos que permiten el establecimiento de la atención conjunta son de índole emotivo que cumplen su deber en la medida que permiten compartir experiencias. Las fuentes de esta posición son los clásicos trabajos de Hans Werner y Bernard Kaplan (1964) que han encontrado un reciente apoyo evidencial en las teorías de las neuronas espejo (Rizolatti et al. 2006; Iacoboni 2009) y en algunas teorías de la emoción (Russell 1999, 2003). Las propuestas provenientes de este enfoque son altamente compatibles con las definiciones estrictas de los conceptos psicológicos que ofrece la filosofía.

En suma, nuestra defensa psicológica del lingualismo depende, por un lado, de un uso estricto de los conceptos psicológicos y, por otro, de un apoyo evidencial empírico. El primer aspecto es descuidado por los antilingualistas destructivos y por los antilingualistas constructivos que siguen el modelo de la intención pre-conceptual para explicar la atención conjunta. El lingualismo que defendemos, apoyado en la teoría de la triangulación y en el modelo experiencial-contemplativo de la atención conjunta, es compatible con nuestras dos exigencias, es plausible filosófica y psicológicamente.

La estructura argumentativa general del trabajo es la siguiente:

Lingualismo filosófico

LF: “Los lingualistas niegan que los animales no lingüísticos tengan pensamientos.” (Glock 2009, 74)

Dos corolarios ontogenéticos del lingualismo (LFO):

LFO1: los niños preverbales no tienen pensamientos (Davidson 1997)

LFO2: no hay criaturas lingüísticas que carezcan de pensamientos (Davidson 1997)

Antilingualismo psicológico destructivo:

APD: los animales no lingüísticos tienen pensamientos (Baker 2008, Chadha 2007)

Dos objeciones ontogenéticas al lingualismo filosófico:

APDO1: Hay evidencia empírica de que los niños preverbales tienen pensamientos.

APDO2: Los autistas de alto desempeño son usuarios del lenguaje pero carecen de pensamientos (Andrews 2002, Andrews et al. 2006, Glüer et al. 2003).

Revisión crítica del antilingualismo psicológico destructivo:

CAPD1: La interpretación de los datos empíricos depende no sólo de los datos mismos, sino también de los conceptos empleados en la formulación de las conclusiones que se pretenden avalar con la evidencia empírica (Heal 2005).

Las afirmaciones empíricas de la psicología sobre el pensamiento infantil preverbal no hacen un empleo riguroso y plausible del concepto de ‘pensamiento’ (Carruthers 1992, Glock 2009).

CAPD2: Los autistas de alto desempeño carecen de pensamientos. No pasan la prueba de creencia falsa. Sin embargo, tampoco son hablantes competentes, pues el concepto mismo de ‘hablante competente’ supone el uso de un vocabulario psicológico que responde a características semánticas bien especificadas (Bowma 2006a, 2006b, Frith 2003).

Antilingualismo psicológico constructivo general

APC: El antilingualismo gana plausibilidad empírica cuando se lo complementa con una teoría del aprendizaje (Martínez 2006).

Antilingualismo psicológico constructivo especial

APCE: El lingualismo de la teoría de la triangulación se complementa con una teoría de la atención conjunta entendida desde el modelo de la intención preconceptual (Brinck 2004).

Crítica al antilingualismo constructivo especial

CAPCE: El modelo de la intención preconceptual para la atención conjunta es circular. Por lo tanto no proporciona buen apoyo psicológico empírico para el lingualismo filosófico propio de la teoría de la triangulación (Acero 2007, Gunther 2003).

Nuestra propuesta:

Lingualismo triangular (filosófico y psicológico: conceptualmente preciso y empíricamente plausible).

LTF&P: El lingualismo triangular es empíricamente plausible según la teoría experiencial-contemplativa de la atención conjunta.

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