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ESSENTIALISM

Essentialism is closely related to necessity. There are two kinds of necessity: necessity of the truth of a proposition (e.g., the truth of “All bachelors are unmarried”), and necessity of the possession of a property by an individual (e.g., the possession of personhood by you). The former is known as necessity *de dicto*, and the latter necessity *de re*. Debates on essentialism in the United States closely parallel those on necessities *de dicto* and *de re*. For any individual or kind of individual x and any property P , P is an essential property of x just if x necessarily has P , i.e., x has P in every possible world in which x exists.

Haecceity, World-Indexing, Materiality, Origin, and Composition

Alvin Plantinga offers four kinds of essential properties of individuals. First, being unmarried if a bachelor is an essential property of Socrates; so is having some property. Such properties are uninteresting essential properties of individuals, for they are based on necessities *de dicto* of the analytic kind (“It is necessarily the case that all bachelors are unmarried”) or possessed by all individuals (every individual has some property). Second, being Socrates is an essential property of Socrates. In general, for any individual, being that very individual is called the individual’s

haecceity, and any individual's haecceity is an essential property of that individual. Socrates also has any property logically entailed by his haecceity as his essential property: e.g., the property of being either Socrates or Plato. Third, given that Socrates is snub-nosed in the actual world, being snub-nosed in the actual world is his essential property, even though the property of being snub-nosed is not; for in any possible world w in which he exists, Socrates is such that he is snub-nosed in the actual world, even though he may not be snub-nosed in w . In general, for any individual x , any property P , and any world w , if x has P in w , then having P in w is a world-indexed property essential to x . Fourth, assuming that Socrates is a material object, being material is his essential property. It is an essential property of any material object. Correspondingly, being non-material is an essential property of any non-material object.

Saul Kripke proposes different types of essential properties of individuals. One is origin. Assume that you originated in a particular egg e and a particular sperm s . Then having originated in e and s is your essential property. Nobody who did not originate in e and s , however similar s/he might be to you, could possibly be you. Another is composition. Assume that the shirt you are wearing is composed of cotton fibers. Then being made of cotton is an essential property of the shirt. No shirt that were not made of cotton, however similar it might be to the shirt, could possibly be that very shirt.

Natural Kinds

Kripke also proposes essential properties of natural kinds, which are analogous to compositional properties of individuals. Given that the chemical structure of water is H_2O , having the chemical structure H_2O is an essential property of water. No natural kind that did not have the chemical structure H_2O , however similar it might be to water (colorless, tasteless, odorless, thirst-quenching, etc.), could possibly be water. The essentiality of this property to water is tied to the

corresponding necessity *de dicto*, viz., the necessity of “The chemical structure of water is H₂O.” Unlike “All bachelors are unmarried,” this proposition is not analytic, hence its necessity does not stem from conceptual connections. Kripke calls such a proposition *metaphysically necessary*. Propositions ascribing the origin or composition of an individual are also metaphysically necessary.

Kripke pursues a similar line of reasoning to a surprising conclusion. Unicorns are an animal species that does not actually exist. So, there are no actual genetic traits, other micro features, or evolutionary characteristics that would mark unicornhood. Given this, unicorns lack essential properties which would distinguish them from other animal species. But no possible species could lack such essential properties. Therefore, unicorns are impossible.

Individual Essence

According to Plantinga, *P* is an individual essence of *x* just if *P* is *x*'s essential property and no individual distinct from *x* has *P* in any possible world. Socrates's haecceity and his origin are his individual essences, but the properties of being unmarried if a bachelor, having some property, being snub-nosed in the actual world, and being material are not; neither is being made of cotton an individual essence of your cotton shirt. Note that Socrates's haecceity involves a particular person (himself) and his origin involves particular cells (*e* and *s*). It is unclear whether there is an individual essence that is a purely qualitative property involving no individual at all. If haecceities are independent of all purely qualitative properties, no purely qualitative property is an individual essence. Max Black discusses a world in which two qualitatively identical but numerically distinct spheres, and nothing else, exist. If, for every purely qualitative property, there is an analog of Black's world and it is a possible world, then no purely qualitative property is an individual essence.

Resistance to Essentialism

According to W. V. Quine, a man who is both a mathematician and a cyclist may at best be said to be necessarily rational under the label “mathematician” and necessarily bipedal under the label “cyclist,” but he is neither necessarily one way or another independently of a label, and to claim that he is is to accept Aristotelian essentialism. Aristotelian essentialism affirms claims of necessity *de re*, and Quine rejects all such claims as conceptually muddled. He also rejects all claims of necessity *de dicto* not reducible to logical truth, so he rejects Kripke’s metaphysical necessities.

See also: analytic truths; Carnap, Rudolph; essence; metaphysics; modality; natural kinds; necessity; possibility; possible worlds; Quine, W. V. O.

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GRAMMAR

Grammar for a language is a system which provides linguistic characterizations of all and only sentences of the language. Philosophically, among such characterizations, the syntactic and the semantic are central, while the phonological and the orthographical are peripheral. Two grammatical theories in the study of natural language in the United States stand out: Noam Chomsky's and Richard Montague's.

According to Chomsky's "transformational-generative grammar," the characterization of the sentences of any natural language L is carried out in stages. First, a finite number of basic phrase structures, called "deep structures," are specified, along with a finite vocabulary. Second, a finite number of rules according to which the deep structures may be transformed are given. Third, it is declared that an item is a sentence of L just if it results from applying one or more transformation rules to a deep structure. Fourth, the deep structure of each sentence S of L is subjected to semantic interpretation, which specifies the linguistic meaning of S . Chomsky considers his theory to be a theory of human cognitive capacity, and as such a branch of psychology. He also believes in "universal grammar," a theory of the innate mechanism of the linguistic module of the mind common to all human beings. Chomsky's argument for the existence of such a mechanism is known as the "argument from the poverty of stimulus": almost all human beings acquire their first language by being exposed to low-grade linguistic data, and the most plausible explanation of this phenomenon postulates an innate cognitive system endowed with a linguistic module that is highly structured to impose significant constraints on humanly learnable languages. This rejection of the mind as *tabula rasa* puts Chomsky squarely within the rationalist tradition.

Three main features distinguish "Montague grammar." First, it aims to respect the "surface" structures of sentences, rejecting a sharp distinction between them and the deep

structures. The role of transformation rules is thus drastically curtailed, and the logical form of a sentence is more or less transparent in its surface structure. Second, while Chomsky's main focus is on syntax, Montague's primary interest lies in semantics. The framework he uses is that of intensional (modal and tense) logic, which is obtained by adding indices as alethic relativizers to classic logic. For example, where classic logic characterizes a sentence as true or false, intensional logic characterizes it as true or false relative to a possible world or a time. Semantic values are thus subject to more parameters in intensional logic, and this gives it more flexibility. Third, unlike Chomsky, Montague does not consider grammar to be part of psychology, so the question of psychological reality is not deemed central to the evaluation of grammar. Instead, grammar is regarded as a branch of mathematical logic and to be evaluated accordingly.

See also: logic: modal; semantics.

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LOGIC: MODAL

Modal logic is logic of alethic modalities, viz., actuality, possibility, and necessity. As early as 1918, dissatisfied with the dominant treatment of conditionals as material implication (“‘If P then Q ’ is true just if either P is false or Q is true”), C. I. Lewis proposed an alternative treatment: ‘If P then Q ’ is true just if P strictly implies Q . In 1932, Lewis, with C. H. Langford, defined strict implication in terms of possibility: P strictly implies Q just if it is not possible for P to be true and Q false, or in symbols, $\sim\Diamond(P \& \sim Q)$, where \sim is the negation operator and \Diamond is the possibility operator. Alternatively, P strictly implies Q just if it is necessarily the case that if P then Q . Symbolizing the necessity operator as \Box , P strictly implies Q just if $\Box(P \supset Q)$, where \supset is the material implication operator. It is easy to see that \Diamond and \Box are inter-definable: $\Diamond P \equiv_{df} \sim\Box\sim P$; $\Box P \equiv_{df} \sim\Diamond\sim P$. Modal logic began as a syntactic system governed by axioms for \Diamond and \Box , has been developed extensively since, and now provides important tools in all areas of philosophical investigation.

Modal logicians follow Leibniz and relativize truth to possible worlds. Moreover, they speak of the accessibility relation, R , between possible worlds and lay out the following truth conditions for \Diamond and \Box :

$\Diamond P$ is true in a possible world w just if P is true in at least one possible world bearing R to w ;

$\Box P$ is true in a possible world w just if P is true in every possible world bearing R to w .

The most comprehensive system of modal logic is known as S5 and consists of the following axioms:

PL. All truths of propositional logic;

T. $\Box P \supset P$;

K. $\Box(P \supset Q) \supset (\Box P \supset \Box Q)$;

5. $\Diamond P \supset \Box\Diamond P$.

There are two rules of inference:

Modus Ponens. Infer Q from $P \supset Q$ and P ;

Necessitation. Infer $\Box P$ from P .

S5 is widely regarded as the standard system for logical possibility and necessity. The axiom T requires R to be reflexive (for every w , wRw), and 5 requires R to be euclidean (if w_1Rw_2 and w_1Rw_3 , then w_2Rw_3). Any relation that is reflexive and euclidean is an equivalence relation. This means that S5 partitions the space of possible worlds into sub-spaces within each of which every world is accessible from every world. In the simplest such model, the entire space of possible worlds is the only such sub-space, i.e., every world is accessible from every world.

If we combine S5 with first-order predicate logic, the result is quantified modal logic (QML). Ruth Barcan (Marcus) and Rudolf Carnap pioneered rigorous investigations of QML, and Saul Kripke gave a definitive treatment of the semantics for QML. QML yields two controversial theorems: $\forall x\Box Fx \supset \Box\forall x Fx$ (the Barcan Formula) and $\Box\forall x Fx \supset \forall x\Box Fx$ (the Converse Barcan Formula). The Barcan Formula says that if everything actual is necessarily F , then necessarily everything is F . Let F mean “is physical” and assume physicalism to be actually true. Also assume that every physical thing is necessarily physical. Then everything actual is necessarily physical. But at the same time, it is also possible for there to be a non-physical thing, say, a Cartesian ego or an abstract object of some kind. So, it is not necessarily the case that everything is physical. Therefore, it appears, the Barcan Formula is false. Let F mean “exists.” Then since in every world everything in that world exists, and not everything in the actual world exists in every world, the Converse Barcan Formula appears false. Various attempts to overcome these problems – some syntactic, others semantic – constitute important parts of the development of QML.

See also: Carnap, Rudolf; designation; essentialism; Lewis, Clarence Irving; logic: deductive; metaphysics; modality; necessity; possibility; possible worlds; symbolic logic.

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POSSIBILITY

Systematic study of possibility began with the invention of modal logic by C. I. Lewis. Semantics of modal logic postulates possible worlds and defines possible truth as truth in some possible world. In the United States, the study of possibility has been closely intertwined with the study of conditionals ("If P then Q "). C. I. Lewis's modal logic was inspired by considerations of strict implication. P strictly implies Q just if there is no possible world in which P is true and Q false. Later, Robert Stalnaker proposed the following semantics for counterfactual conditionals: "If P were the case, then Q would be the case" is true just if Q is true in the closest P -world, i.e., Q is

true in the possible world in which P is true and which is closer to the actual world than any other world in which P is true. Shortly thereafter, David Lewis offered a more generalized treatment without the assumption of the existence of the closest P -world, along with extensive discussions of the closeness relation.

As the metaphysical foundations for his theory of counterfactual conditionals, David Lewis proposed a realist theory of possible worlds and *possibilia* (possible individuals). On his theory, the actual world is a maximal whole made up of all individuals spatiotemporally related to us, and a non-actual possible world is a maximal whole made up of spatiotemporally related non-actual *possibilia*. Every *possibile*, actual or non-actual, exists in just one world. Hubert Humphrey could have won the presidential election in 1968. So, in some possible world Humphrey did win. But if Humphrey does not exist in any world other than the actual world, how did he manage to win in any other world? Lewis resorts to counterpart theory. For Humphrey to win in a non-actual world w is for there to be someone who is his counterpart in w who wins. To be Humphrey's counterpart is to resemble Humphrey in relevant respects, where what is relevant varies from one context of discourse to another, depending on the pragmatics of the discourse.

Truth in at least one possible world is possibility in the absolute sense, or logical possibility. Truth in at least one possible world in which a particular proposition P is true is possibility in a restricted sense. Let P be the conjunction of all laws of nature, and we have nomological possibility. If P is the totality of all that is known, we have epistemic possibility. If P lays out all law-like generalizations of politics, we have political possibility. And so on.

See also: conditionals; contingency; essentialism; Lewis, Clarence Irving; logic: modal;

modality; natural kinds; necessity; possible worlds.

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