

## **Alethic modality is deontic.**

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**Abstract:** according to one view of alethic modality, to say that something is necessary is to say that we must take that thing to be true according to rules of thinking or linguistic rules. In other words, alethic modality is reduced to deontic modality with respect to thoughts or language. This view has been argued to have many philosophical advantages over the traditional view that takes alethic modality to describe something in the world. In this paper, I argue that the deontic view also enjoys a wide range of empirical supports from linguistics and psychology.

**Keywords:** modal normativism, alethic modality, semantic change, modal cognition

### **Introduction**

Intuitively, alethic modal claims like ‘all bachelors are necessarily male’ describe things in the world. But there are different possible answers as to what they describe. Perhaps they describe facts about essences. It is part of the essence of bachelors that they are male. Or perhaps they describe facts about possible worlds. In all possible worlds where bachelors exist, they are male. Or perhaps the modal claims describe something about language. It is part of our linguistic conventions that ‘bachelor’ can only be applied to what ‘male’ can be applied.

But none of these answers are completely satisfying. The essentialist answer posits primitive modality and leave mysterious necessary connections in the world. The possible world answer, in Lewis’s version, involves incredible ontology and raises the epistemological question of how we can ever know anything about possible worlds other than ours. The linguistic convention answer faces the contingency problem. If we had different linguistic conventions, the modal facts describing them would have been different. But then bachelors could have been not male.

To respond to all these problems, one thought is that perhaps alethic modal claims do not describe facts at all. Instead, they prescribe norms. According to Blackburn (1986, p.60), saying that something is necessary ‘is more like adopting a norm, or a policy or a rule that a thesis be put ‘in the archives’, above the hurly-burly of empirical determination’ and ‘this kind of rule makes [certain] courses of thought intellectually obligatory’ (1986, p.60). Saying that bachelors are necessarily male describes nothing in the world beyond that bachelors are male. The modal force marks our commitment to ‘bachelors are male’ as a norm of thinking—something we hold as true beyond empirical challenges and never negate in any hypothetical reasoning. In this sense, alethic modality is a kind of deontic modality, concerning our thoughts. Call the idea that alethic modality is deontic ‘the deontic thesis.’

The deontic thesis can avoid the problems of the non-deontic accounts. Since alethic modality is now deontic, no mysterious necessary connections are left in the world and no implausible ontology is required. And since we seem to know all kinds of norms, no special epistemological challenge is posited in assuming that we can know norms of thinking. Finally, since norms of thinking do not describe any contingent facts, they themselves can be necessary.

Besides its philosophical merits, however, the deontic thesis also receives powerful empirical support. It turns out that many studies in linguistics and psychology contain potential evidence for the deontic thesis, even though the linguists and psychologists do not have the thesis in mind when conducting their studies. The job of this paper, then, is to explore and argue for these hidden evidential connections. Three groups of empirical studies will be considered. First, in historical linguistics (Section 3), it has been found that across languages, the words expressing both alethic and deontic modal meanings such as ‘must’ acquire their deontic meanings before alethic meanings. This suggests that alethic meanings may develop from deontic meanings. Second, in child language acquisition (Section 4), the idea that alethic meanings come from deontic meanings is further supported by the evidence that across languages, children also learn deontic meanings before alethic ones. In addition, it has been suggested that children’s alethic modal comprehension is related to how well they can think about mental content as separated from reality. This is consistent with the deontic thesis because if alethic modality is about our commitment to certain mental content, its comprehension requires access to this content. Finally, studies in modal cognition (Section 5) show that alethic and deontic modal judgments share similar developmental trajectories and play similar roles in counterfactual reasoning and

reasoning about whether one is free to do something. These results suggest that the same psychological mechanism may underly both alethic and deontic judgments, and feed into our reasonings about counterfactuals and freedom. And the deontic thesis provides a natural explanation for why alethic and deontic judgments share the same psychological mechanism: because they are both deontic. After laying out the empirical results, I will argue (Section 6) that the fact that the results from historical linguistics, language acquisition, and cognition all converge on the deontic thesis provides even stronger support to the thesis.

Besides defending the deontic thesis, this paper aims to make two contributions. First, empirical considerations have been playing an important role in modal epistemology (e.g., Kroedel 2012, Nolan 2017, 2020, Vetter forthcoming) but not yet in modal metaphysics, perhaps due to the belief that empirical studies are neutral between modal realism and anti-realism. This paper shows that at least in the case of the deontic thesis, empirical studies can have important metaphysical implications. Second, this paper brings a new project to experimental philosophy in addition to traditional topics such as free will (e.g., Deery et al. 2015, Nahmias et al. 2006, Nichols and Knobe 2007) and knowledge (e.g., Buckwalter 2010, Sripada and Stanley 2012, Myers-Schulz and Schwitzgebel 2013). More experiments can be derived from the framework laid out in this paper (Section 7). And this paper goes beyond the traditional method in experimental philosophy that appeals to people's intuition on philosophical issues. It focuses on the wide range of implications that the deontic thesis can have on people's linguistic behaviors, psychological processes, etc., and the investigations of those implications.

## **1. The deontic thesis: a philosophical overview**

The deontic thesis in its most basic form says that alethic modal truths are deontic modal truths. From here there are two options to choose. The first option is mentioned in the Introduction and may be called 'the psychological deontic thesis.' According to it, alethic truths are deontic truths governing how we should think. Thus, 'it is necessary that ...' corresponds to 'we must think that ...' And 'it is possible that ...' corresponds to 'we are permitted to think that ...' Blackburn adopts this option. Brandom (2013) and Divers and González-Varela (2013) can be understood as adopting this option as well. So is Hume, according to Holden's interpretation (2014). The second option may be called 'the linguistic deontic thesis.' According to this option, alethic

modal truths are deontic truths governing how we should use language. According to Thomasson (2007a, 2020), ‘bachelors are necessarily male’ express our commitment to the linguistic rules that require the term ‘bachelor’ to only apply to what ‘male’ applies. In this case, ‘it is necessary that ...’ corresponds to ‘we must say that...according to linguistic rules’ and ‘it is possible that...’ corresponds to ‘we are permitted to say that ... according to linguistic rules.’

The deontic thesis in both versions often starts from cases of metaphysical modality such as ‘bachelors are necessarily male,’ ‘nothing can be both red and green all over,’ ‘parthood must be transitive,’ etc. These cases according to the thesis prescribe unconditional norms of thinking or linguistic norms. But the thesis can be expanded to other alethic modalities as well. Nomic modality, for example, may be expressing norms of thinking or linguistic norms conditioned on all empirical facts in the world (e.g., Thomasson 2020 p.121-2, Williams 2011, p.323-29). Thus, ‘nothing can travel faster than light’ means that given empirical facts as what they are, it would violate norms of thinking or linguistic norms to say that something travels faster than light. In the rest of the paper, I will take the deontic thesis to be about alethic modality in general.

Both the psychological and linguistic versions of the deontic thesis posit no primitive alethic modality in the world and requires no implausible ontology or epistemology. Left in the world are only deontic facts about how we should think or say. And depending on one’s metaphysics, one may choose to further reduce these facts to, for example, our attitude of endorsement towards the relevant norms (cf. Blackburn 1986 Chapter 6, Gibbard 1990).

The two versions of the deontic thesis may require different modal epistemologies. The psychological deonticist often takes acquisition of metaphysical modal knowledge to be a matter of figuring out our imaginative boundary (e.g., Blackburn 1986 Chapter 3).  $p$  is necessary if and only if we must think  $p$ . And we must think  $p$  if and only if  $\sim p$  is unimaginable. The linguistic deonticist, on the other hand, takes metaphysical modal knowledge to be linguistic knowledge.  $p$  is necessary if and only if  $\sim p$  is forbidden by linguistic rules. And the latter can be known by, for example, checking the dictionary. But notice that the linguistic deonticist can take imagination to be a reliable source of metaphysical modal knowledge as well (e.g., Thomasson 2020 7.3). For imagination may tell us about linguistic rules. That we cannot imagine a non-male bachelor may be because we cannot imagine someone that is both described by ‘bachelor’ and not described by ‘male.’

Given the epistemologies, one may wonder whether the deontic thesis in either version can make alethic modal truths necessary as they should be. Even if we cannot imagine a non-bachelor in the actual world and hence must think of bachelors as males, it could have been the case that we can imagine it in a different possible world (where, say, we reason in a dialethic way) and hence are permitted to think of non-male bachelors in that world. But if so, it seems that it is not necessary that bachelors are necessarily male. And so bachelors are not necessarily male. The same goes for the linguistic version. Even if our actual linguistic rules require ‘bachelor’ to only apply to what ‘male’ applies, there surely could have been linguistic rules that do not do so. And if this is the case, it seems that bachelors are not necessarily necessarily male and hence are not necessarily male.

To this worry, proponents of both versions of deontic theses stress the fact that actual norms of thinking or linguistic norms govern our entire modalization (e.g., Holden 2014 p.404, Thomasson 2020 3.4). The relevant norms could have been different, as long as the possibilities are not ruled out by the actual norms. And people in those possibilities might have had different alethic modal judgments because they had different norms. But bachelors would still be male in those possibilities, for non-male bachelors are ruled out by the actual norms. And because in no world bachelors are non-male, in all worlds bachelors are male. Hence bachelors are necessarily male and necessarily necessarily male.

With the philosophical overview of the deontic thesis in hand, we now move on to the empirical defense of the thesis. To narrow the scope of the paper, I will focus on the psychological version of the thesis. After I lay out the case, however, in Section 6, I will include a brief discussion on which part of the defense is applicable to the linguistic version as well and what more needs to be done in order to empirically defend the linguistic version.

## **2. Historical linguistics**

It is a wide-spread linguistic phenomenon that the same set of words are used to express both alethic and deontic modal meanings. ‘I can’t fly’ expresses inability. ‘I can’t interrupt other people’s conversation’ expresses the lack of permission. ‘He may come tomorrow’ may express that it is possible that he comes tomorrow. Or it may express the permission for him to come tomorrow. ‘Nothing should travel faster than light’ expresses physical impossibility. ‘You should

be on time for the meeting' expresses a demand for someone to be on time. This phenomenon is shared across language families (see Palmer (2001, 4.1.1) for an overview).

The common vocabulary often breaks down somewhere. For example, in English, as obligation 'must' has the negation 'mustn't' but as necessity it doesn't. As obligation 'not must' has a suppletive 'needn't' but as necessity it doesn't. Past tenses 'may have' and 'must have' always express alethic not deontic meanings. Other asymmetries have been observed in other languages (e.g., Palmer 1995, 1997, Picallo 1990 p.287). But despite these differences, it is still worth asking why the basic alethic and deontic expressions overlap.<sup>1</sup> One obvious answer points to their formal similarities (e.g., Kratzer 1977). Obligation and permission work a lot like necessity and possibility and can be formalized into similar logical systems with similar semantics. Perhaps these two sets of meanings are labeled according to their formal similarities.

There are two reasons that this answer is unsatisfying. The first is that now we may want an explanation for the formal similarities. Alethic and deontic meanings seem totally unrelated content-wise. Is it simply a coincidence that these two sets of meanings admit similar analyses or is it due to some other similarities between the two sets of meanings?<sup>2</sup> The second reason that this answer is unsatisfying is that it fails to predict a certain kind of asymmetry between alethic and deontic meanings. If alethic and deontic meanings share the same words only because of their formal similarities, then it should be random whether historically, those words pick up alethic meanings before deontic meanings, or vice versa. But this is not what was found.

Across languages, deontic meanings are picked up before alethic meanings. The present-day English words such as 'shall' and 'must' acquired first their deontic meanings and then their alethic meanings (e.g., Bybee and Pagliuca 1985, Traugott 1989).<sup>3</sup> Bybee and Pagliuca (1985)

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<sup>1</sup> Modal verbs such as 'may' and 'must' have been argued to be more basic than other modal expressions such as 'it is possible that...' and 'it is obligatory that...' where alethic and deontic expressions don't overlap (Papafragou 1998 p.391, Halliday 2009 p.116-138, Thomasson forthcoming).

<sup>2</sup> To this question, Vetter (2015, 6.9.2), for example, suggests that alethic and deontic meanings have similar functions. 'You can't break the vase' in both the alethic and deontic sense suggest not break the vase. And the formal similarities reflect these functional similarities.

<sup>3</sup> Some notable counterexamples are 'can' and 'may,' which acquire first the meaning of ability, and then possibility, and finally permissibility (Bybee and Pagliuca 1985, Bybee et al. 1994 6.4-6). Here it has been argued that the meaning of ability is first generalized to include all sorts of physical, mental, and social conditions for an agent to perform an action. This stage is called 'root possibility.' And root possibility then gives rise to permissibility and possibility. Notice that this picture is not necessarily in tension with the position that will be argued below. Even if some alethic meanings come not from deontic meanings but from their common core, the common core may be deontic-like enough for us to say that alethic modality is deontic. Perhaps the common core regulates actions without distinguishing whether the regulative force is natural or social. And alethic meanings then

study 25 languages and observe that when words express alethic meanings, they are more grammaticalized than when they express deontic meanings. Grammaticalization is a historical process where words with more specific meanings (e.g., 'have' as in 'I have money') develop into grammatical markers with more general meanings (e.g., 'have' as in 'I have to go'). The more grammaticalized, the more general the meaning gets, and the latter it appears. Bybee and Pagliuca argue that their data on grammaticalization suggest that alethic meanings appeared later than deontic meanings.

Given this asymmetry between alethic and deontic meanings, Sweetser (1986, 1990 Chapter 3) suggests that alethic and deontic meanings share the same words not just because their formal similarities. The two sets of meanings are also intrinsically connected in the sense that alethic meanings are metaphorical extensions of the deontic ones because 'we view our reasoning processes as being subject to compulsions, obligations, and other modalities, just as our actions are subject to modalities of the same sort.' (p.50) The common words first pick up deontic meanings and only later alethic meanings because the latter are deontic with respect to thoughts and the common words result from metaphorically extending deontic words with respect to actions to the more abstract, intellectual domain.

Notice how Sweetser's explanation assumes the deontic thesis. Also notice that her explanation does not imply that we don't express alethic meanings before deontic words pick them up. There may very well be words that express alethic meanings long before deontic words do so. The explanation, rather, says that there is a certain mechanism, e.g., metaphorical extension, underlying how words obtain new meanings. And the fact that deontic words tend to obtain alethic meanings suggests that the two sets of meanings are connected via the mechanism.

Sweetser's explanation also fits with the general tendency in historical semantic change, where words expressing the more concrete, socio-physical meanings gradually pick up the more abstract, psychological, and emotional meanings. For example, 'see' as perception later acquired the meaning of understanding (Sweetser 1990, 2.3). 'Since' as temporal relation later expressed causal relation as well (Traugott and König 1991). But more relevant to our purposes are certain speech-act verbs such as 'insist,' 'allow,' and 'expect' (Traugott 1989). 'Insist' had the deontic meaning of demanding in the late 17<sup>th</sup> century and got the meaning of maintaining a proposition

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develop from this common core by restricting to natural force and extending the target of regulation from actions to thoughts.

a century later. ‘Allow’ had the deontic meaning of permitting in the late 14<sup>th</sup> century and acquired the meaning of declaring some proposition to be true three centuries later. These are examples where deontic words get to express attitudes toward propositions, just like in the case of ‘shall’ and ‘must.’

To summarize this section, the deontic thesis gets support from linguistic studies in the sense that it can explain why the same words get to express both alethic and deontic meanings, why alethic and deontic meanings have similar formal features, and why the words first expressing deontic meanings get to pick up alethic meanings later. And the last point is explained in a way that fits with the more general tendency in semantic change.

### **3. Acquisition of alethic modal language**

The story of how children learn the common words for both alethic and deontic meanings matches with the historical story of semantic change: across languages, they first learn deontic meanings and then alethic meanings (Papafragou 2001). In English, children start to use ‘can’ to express deontic meaning, along with the meaning of ability, around the age of two and start to use it to express alethic meaning roughly one year later (e.g., Shatz and Wilcox 1991, Wells 1985 4.5).<sup>4</sup> In Antigua creole, children first use the word *mosa*, meaning ‘have to,’ in the deontic sense even though adults almost exclusively use it in the alethic sense (Shepherd 1993). Different explanations have been proposed for why deontic meanings arrive earlier than alethic ones. It could be that caregivers express deontic meanings more frequently, although this cannot be the whole story given the data from Antigua creole and other studies (e.g., Choi 2006, Slobin 1997). Or it could be that it is more important for children’s survival that they quickly grasp the social regulations in their environment (Wells 1985 4.5).

Some linguists, on the other hand, focus on the parallel between child language development and historical semantic change (e.g., Diessel 2011, Ziegeler 1997). Such parallel has been observed elsewhere. For example, in English, children learn past perfect tense before past simple tense (Shirai and Andersen 1995), reflecting the historical order of the two

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<sup>4</sup> That children learn the meaning of ability early may look like a counterexample to our claim that deontic meanings come before alethic meanings, for ability in philosophy is alethic. The similar problem arises in historical linguistics as well, see Footnote 3 on response.



grammatical structures (Bybee et al. 1994). In Chinese, *ba* was used as a main verb, meaning 'grasp,' in the 5<sup>th</sup> century B.C. but started to grammaticalized into an object marker in the 8<sup>th</sup> century A.D. (Slobin 1997). Nowadays, *ba* is almost never used as a main verb by adults and yet children often mistakenly treat it so when learning the word (Erbaugh 1992, Jepson 1989). According to Ziegeler (1997), these results show that sometimes, child language development and historical semantic change are driven by the same underlying mechanisms. In our case, it means that just like the historical story where alethic meanings appear later as metaphoric extensions of deontic meanings, children may first learn the deontic meanings to regulate their actions and later metaphorically extend the meanings to regulate their thoughts.

This developmental story is supported by a group of studies that relate modal comprehension with theory of mind, i.e., the abilities to attribute mental states to others and to oneself, and using them to understand and predict actions. If alethic modal statements express regulations of thoughts, then it seems that their comprehension requires access to one's thoughts. And so better access to one's thoughts may correspond to better alethic modal comprehension.

Moore et al. (1990) find that 4-year-olds who better understand modal sentences like 'the candy must be in the red box' also better understand mental verb sentences like 'I know that the candy is in the red/blue box.' In their studies, a red and a blue boxes were presented to the children with one of the boxes containing a candy. After hearing 'the candy must/might be in the red/blue box,' the children were asked to pick the box that contained the candy. They were asked to do the same after hearing 'I think/know that the candy is in the red/blue box.' And then they participated in three standard theory of mind tests including the false belief test, the representational change test, and the appearance-reality test. It was found that the success in modal comprehension positively correlates with the success in mental verb comprehension and theory of mind tests.

According to Papafragou's (2001) explanation of the experimental results, modal sentences like 'the candy must be in the red box' specifies the representational relation between 'the candy is in the red box' and reality. Their comprehension requires the ability to form meta-representations of first-order mental representations like the candy is in the red box. The same ability is required for comprehending mental verb sentences like 'I think that the candy is in the red box' and for theory of mind, which attributes mental states to others and to oneself. In this sense, one's performance in modal comprehension correlates with one's performance in mental

verb comprehension and in theory of mind because all require the same ability.<sup>5</sup> Notice that this explanation resonates with the deontic thesis, according to which alethic modal sentences express regulations of thoughts and hence must be meta-representational.<sup>6</sup>

But to really connect to the deontic thesis, one hurdle is that modal sentences like ‘the candy must be in the red box’ seem epistemic rather than alethic. It most likely says that the candy must be in the red box, given the available evidence, not that the candy could not have been elsewhere. But there is a reason to think that the same experimental results should be obtained from alethic modals and hence the same meta-representational explanation should apply. Notice that what has been tested in the studies of Moore et al. is whether children understand that modal verbs like ‘must’ and ‘might’ in non-deontic contexts can direct actions by ruling out or in alternative scenarios. The children who reach for the red box after hearing ‘the candy must be in the red box’ understand that the scenario where the candy is in the blue box has been ruled out. This aspect is the same for both epistemic and alethic modality. If the same studies were conducted using alethic modals such as ‘the penguin must/might be a bird/mammal,’ a reasonable hypothesis is that the children who perform better on the epistemic cases would perform better on the alethic cases as well.

Additionally, once one takes alethic modality to be deontic, it is natural for one to take epistemic modality to be deontic as well (e.g., Thomasson 2020, p.63) . So p is necessary in the epistemic sense just in case that we must accept p, given that we accept the current evidence. The result is a more unifying thesis. And the studies on epistemic modals can be seen as testing this more unifying thesis.

To summarize this section, the idea that alethic meanings are extensions of deontic meanings applied to thoughts gets further support from developmental data. First, children across languages learn deontic meanings before they learn alethic meanings. Second, children’s comprehension of alethic meanings may positively correlate with the development of theory of mind, which involves the ability to represent thoughts.

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<sup>5</sup> This view is also supported by the studies that relate the lack of modal language with autism, a condition often associated with underdeveloped theory of mind. Tager-Flusberg (1993, 1997) finds that autistic children rarely use mental verbs as well as modal verbs, compared to children with Down’s syndrome (cf. De Roeck and Nuyts 1994).

<sup>6</sup> The results in theory of mind can also be connected to systemic functional linguistics, according to which modal systems primarily serve the interpersonal functions of regulating people’s behaviors and thoughts (Eggins 2004, p.172-184 Halliday and Matthiessen 2013, p.172-193). Since alethic and epistemic modals are used to regulate thoughts, their comprehension requires the development of theory of mind, which enables access to thoughts.

#### 4. The psychological parallel

It is one thing to comprehend alethic and deontic modal meanings, it is another to make adult-like alethic and deontic modal judgments. In addition to language acquisition, studies show that alethic and deontic modal judgments share similar developmental trajectories. By around age four, children are ready to distinguish impossible events from ordinary ones. For example, Samuel and Taylor (1994) find that children at age five but not three judge that fantasy events such as a moose cooking in a kitchen could not happen in real life. But children even at age six confuse impossible events with non-ordinary ones such as finding an alligator under bed (Shtulman and Carey 2007, Danovitch and Lane 2020, Weisberg and Sobel 2012). In the deontic case, also by round age four, children can distinguish morally impermissible events from permissible ones. Cushman et al. (2013) find that four-year-olds, like adults, condemn not just bad outcomes but bad actions such as shoving someone to the ground. But they continue to struggle with the difference between moral wrongness and social inappropriateness. They sometimes take violations of social norms such as not sitting in the designated place during story time to be bad, deserving punishment, and not relative to rules or contexts (Smetana 1988). Thus, it seems that modal and moral reasonings share the similar developmental timelines. And before they are fully developed, children tend to be ‘harsher’ both as an alethic judge and a deontic judge: they take more things to be impossible or impermissible than adults do.

The shared developmental trajectories can be explained if both alethic and deontic modal judgments are initially produced by the same psychological mechanism, which is gradually developing through young age, and only get separated at later developmental stages (Phillips and Cushman 2007, Shtulman and Phillips 2017). This hypothesis is also supported by the studies that show that young children struggle with the difference between impossible events and impermissible events (Browne and Woolley 2004, Kalish 1998). They take impossible events such as floating in the air to be impermissible and impermissible events such as lying to parents to be impossible (Shtulman and Phillips 2017). Adults may experience the same struggle under time pressure (Phillips and Cushman 2017, Acierno et al. 2022), suggesting that the common mechanism may still be in use after reaching adulthood. And this last point is further supported by the finding of Shtulman and Tong (2013) that adults who are more likely to judge events as impossible are also more likely to judge events as impermissible.

Another group of empirical studies that lend support to the common mechanism hypothesis concerns the functional similarities between alethic and deontic judgments. McCloy and Byrne (2000) show that when a regrettable event happens and people are entertaining how things could have gone differently, they tend to generate scenarios that conform to deontic principles. This, together with the fact that people also tend to generate scenarios that conform to alethic principles such as laws of gravity (Seelau et al. 1995), suggest that alethic and deontic judgments function similarly in generating a relevant set of scenarios in counterfactual thinking (McCloy and Byrne 2000, p.1072). This functional similarity has also been observed in judgments on freedom. When people judge whether an agent is free to do something, they tend to give positive answers both when the agent is physically capable of doing otherwise (Woolfolk et al. 2006) and when doing otherwise is morally good (e.g., Phillips and Knobe 2009, Phillips et al. 2015, Young and Phillips 2011). In the experiment conducted by Phillips and Knobe (2009), the participants are more likely to say that a captain was free to do what he did if he threw his wife overboard to save his ship in a storm than if he threw his wife's cargo overboard.

One implication of these findings is that apparently descriptive reasonings about counterfactuals and freedom are affected by deontic considerations. But regardless of how one thinks of this first implication, another implication of the findings is that the psychological mechanism responsible for selecting relevant scenarios for our reasonings about counterfactuals and freedom may not be sensitive to the alethic-deontic difference.

If alethic and deontic modal judgments have the same initial psychological mechanism, we should ask why the seemingly unrelated judgments share the same psychological mechanism. One answer is that the psychological overlap results from a metaphysical overlap. Regular deontic judgments are judgments on how we should act. Alethic judgments are judgments on how we should think. The reason that the two kinds of judgments share the psychological mechanism is that they are both deontic in the core. Evolutionarily, the common mechanism may first pick up social and moral norms and use them to regulate actions. After we gain the capacities for meta-representing mental content, the mechanism gets co-opted to pick up conceptual norms and use them to regulate thinking, thus matching the story told both in the case of historical semantic change and in the ontogenetic case.

## 5. Taking stock

To summarize what we have covered so far: three groups of empirical findings provide support for the deontic thesis. First, from historical linguistics, words like ‘shall’ and ‘must’ first acquire their deontic meanings and then their alethic meanings, suggesting that alethic meanings may be metaphorical extension of deontic meanings, consistent with the deontic thesis. Second, from language acquisition, children first learn deontic meanings and then alethic meanings, further backing up the metaphoric story and hence the deontic thesis. Additionally, there is good reason to think that alethic modal comprehension correlates with theory of mind, suggesting that the former may require capacities to meta-represent mental representations, also consistent with the deontic thesis. Third, from modal cognition, alethic and deontic modal judgments share similar developmental trajectories and cognitive functions, suggesting a common psychological mechanism underlying both kinds of judgments. And a natural explanation for this common mechanism can be found in the deontic thesis.

These three groups of findings are by no means uncontroversial and standing alone, they are often open to alternative explanations. But the alternative explanations often fail to apply to the findings in the other groups like the explanations surrounding the deontic thesis do. For example, in contrast to Papafragou’s meta-representational explanation, Cournane (2021) holds that children learn deontic meanings earlier than alethic meanings because of the polysemous nature of words like ‘shall’ and ‘must.’ Deontic meanings are picked up earlier because children hear them more often. Alethic meanings arrive later because it takes time for children to realize that one word can have different meanings. Even if this explanation works well in the language acquisition case, it does not in the historical case, where adult speakers already know that words can be polysemous and may hear deontic and alethic meanings equally often in their life. Hence the explanation fails to address the historical phenomenon that deontic meanings come before alethic meanings. Nor does it address the alethic-deontic parallel in modal cognition.

A different example can be found in Traugott (1989) and Bybee et al. (1994, 6.6), who explain the historical phenomenon, not in terms of metaphoric extension, but in terms of conventionalization of conversational implicatures. For example, ‘I should be there in an hour’ may initially express obligation only. But it has the pragmatic implication that the speaker will probably be there in an hour. Overtime, this implication gets conventionalized into the meaning

of ‘should’ and becomes its alethic meaning. This explanation, even if it works well for the historical phenomenon, does not apply to the language acquisition results from children who have not yet possessed adult-like modal reasoning on which they can draw implications (Leahy and Carey 2020). Nor does the explanation address the alethic-deontic parallel in modal cognition.

Finally, the idea that alethic and deontic modal judgments share the same psychological mechanism may be explained, not by the deontic thesis, but by the fact that the two kinds of judgments share the similar formal or pragmatic features (see Footnote 2) such that it would be evolutionarily beneficial to use the same mechanism. But this alternative explanation, unlike the deontic thesis, does not predict the alethic-deontic asymmetry found in the historical linguistics and language acquisition cases.

Hence if we go for the alternative explanations, perhaps with a non-deontic account of alethic modality in the background, we are likely to end up with a hodgepodge of many mutually unrelated factors that all happen to contribute to the found alethic-deontic relations. Whereas if we go for the deontic thesis, we will have a much more holistic picture where the alethic-deontic relations in semantic history, language acquisition, and modal cognition are all interconnected and explained by the central idea that alethic modality is deontic. It is in this sense that the deontic thesis receives strong empirical support.

## **6. Remaining areas to explore**

Given the empirical studies we have discussed so far and their interpretations, there are several directions to further investigate the deontic thesis empirically. First, recall that the relation between modal comprehension and theory of mind was established mostly based on epistemic modals. To tighten up the relation with the deontic thesis, similar studies should be done using alethic modals. In linguistics, the distinction between epistemic and alethic modality rarely receives attention and are often lumped together under ‘propositional modality’ or even just ‘epistemic modality’(e.g., Lyons 1977 Chapter 17, Palmer 2001 Chapter 1, Traugott 1989 p.32). A lot of empirical results mentioned in this paper were originally presented in terms of propositional modality rather than alethic modality. Thus, it is not that alethic meanings always come after deontic meanings, but that alethic and epistemic meanings always come after deontic

meanings. Hence one direction to go in future investigation of the deontic thesis is to see if the patterns preserve when alethic modals are singled out and if other patterns can be found.

Second, we may test whether alethic meanings are indeed metaphoric extensions of deontic meanings via experimental settings. This metaphoric connection, though not intrinsic to the deontic thesis, is a crucial link between the thesis and many empirical findings and hence affects the empirical status of the thesis. If one domain of meanings are metaphoric extensions of another domain of meanings, we may expect priming on the source domain to affect the target domain. Existing studies of this kind have been focused on spatial meanings as the source domain for temporal meanings (e.g., Boroditsky 2000, Matlock et al. 2005). It has been shown that whether people understand ambiguous temporal statements such as ‘the meeting has been moved forward’ as relative to the speaker or relative to the event is affected by how they are primed to think of spatial relations. Similar strategies may be adopted to test the relation between alethic and deontic meanings.

Third, we need to check whether different empirical studies are needed to investigate the linguistic version of the deontic thesis, according to which ‘necessarily p’ is not ‘we must think that p’ but ‘we must say p according to linguistic rules.’ The results from historical linguistics equally support both the psychological version and linguistic version. The psychological version takes alethic meanings as metaphoric extensions of deontic meanings to the realm of thoughts and hence predicts that alethic meanings come after deontic meanings. The linguistic version takes alethic meanings as metaphoric extensions of deontic meanings to the realm of language and hence also predicts that alethic meanings come after deontic meanings. The same holds for the results in modal cognition. Nowhere in our explanation for the developmental and functional similarities between alethic and deontic modal judgments relies on alethic meanings concerning thoughts, not language. So the results there equally support both versions.

But the two versions do make a difference in the language acquisition case. If alethic meanings concern language, it seems that alethic modal comprehension requires meta-representations of, not mental representations, but linguistic representations. Children need to understand sentences not just as potential descriptions of the world. They need to understand sentences as independent objects whose truth or falsity may be derived just from linguistic rules. Such metalinguistic knowledge, if the linguistic deontic thesis is correct, is expected to correlate with alethic modal comprehension. Osherson and Markman (1975) point towards this direction

by showing that children's understanding of logical contradictions and tautologies correlates with their ability to view language as an object. But more studies can be done here.

Lastly, the deontic thesis may not be concerned with alethic modal judgments alone. There may be non-modal judgments on what is actually the case but nonetheless based on alethic modal judgements. For example, we often need to judge whether two objects we see at different times with different properties are the same object. If the two objects differ in certain categories, such as Socrates and a robot that is like Socrates, we tend to say that they are different objects. If two objects differ in some special properties, such as Socrates and someone who does not share Socrates' memories, we tend to say that they are different objects. According to one view (Sidelle 1989, Thomasson 2007b Chapter 2, Wiggin 2016), these identity judgments depend on the alethic modal judgment that Socrates is necessarily a psychologically continuous human being. If this is the case, then the deontic thesis predicts that identity judgments may correlate with deontic modal judgments like alethic modal judgments do.<sup>7</sup> Thus, people who make poor alethic modal judgments may make poor identity judgments. People who are more open-minded about moral rules may be more open-minded about what makes an object the same. And the developmental trajectory of identity judgments may be similar to that of deontic modal judgements: younger children have stricter identity conditions and are more likely to judge things to be different than older children. The deontic thesis may also predict that identity judgments require theory of mind as alethic modal judgments do. Humans and animals with underdeveloped theory of mind may make poor identity judgements. And there may be a positive correlation between performance in identity judgments and performance in the theory of mind tasks.

## **7. Conclusion**

The deontic thesis holds that alethic modality is deontic with respect to thought or language. Compared to its descriptive alternatives, the thesis enjoys both philosophical advantages such as reducing alethic modality without making it contingent and empirical advantages of explaining

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<sup>7</sup> The case of identity judgments is a little complicated. Basic object individuation appears as early as 4 months of age, way before any signs of modal cognition (e.g., Xu 2007). Thus, identity judgments may have two sources: modal judgments and some innate, non-modal judgments. And the correlation between identity judgments and modal judgments may be most clearly observed not in the cases of basic physical object individuation but in more sophisticated cases like individuation of artifacts, groups, and events.



various results from linguistics and psychology. It provides explanations for why alethic and deontic meanings often share the same expressions and why alethic meanings often come later than deontic meanings, both historically and ontogenetically. It explains the correlation between modal comprehension and theory of mind. And it explains the developmental parallel between alethic and deontic modal judgments and their functional similarities.

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