Bases for an Action Logic to Model Negative Modes of Actions

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Abstract

Currently available systems of action deontic logic are not designed to model procedures to assess the conduct of an agent which take into account the intentions of the agent and the circumstances in which she is acting. Yet, procedures of this kind are essential to determine what counts as culpable not doing. In light of this, we design an action logic, **AL**, in which it is possible to distinguish actions that are objectively possible for an agent, *viz.* there are no objective impediments for the agent to do them, and actions that, besides being objectively possible, are compatible with the setting or intentions of the agent.

Keywords: Action deontic logic; Intentional actions, Omission.

1 Introduction

In most juridical systems, but also in everyday practice, the conduct of an agent is typically assessed by answering two fundamental questions:

1. Does the act of the agent comply with the law?
2. Can the agent be held responsible for her act?

By giving a negative answer to the first question, the act of the agent is qualified as a wrong act (or *actus reus*). By giving a positive answer to the second question, the agent is ascribed culpability or blameworthiness for her act, where culpability is usually attributed on the basis of two main criteria:

2.1. a *subjective criterion*, i.e. whether or not the agent really intended to do what she did.

2.2. a *contextual criterion*, i.e. whether or not the circumstances provided the agent with excuses for her behaviour.[1]

Interestingly, most of the currently available systems of action deontic logic (see e.g. [13, 11, 5, 7, 14]) aim at modelling the deontic status of a given system of actions, independently of the intentions of the agent and of the concrete circumstances in which she is acting, thus disregarding subjective and contextual criteria altogether. As a consequence, from the point of view of these systems, the conduct of the agent can only be assessed from a highly abstract perspective. Taking these criteria into account would allow us not only to avoid some well-known paradoxical consequences of these systems (as recently discussed for example in [10, 6]) but also to improve the characterization of central deontic notions essentially involving the responsibility of the agent, like the notion of omission.

The aim of this paper is to lay down the bases for the development of a system of action deontic logic in which the above mentioned improvement can be carried out. We do this by presenting a basic action logic, **AL**, in which a fundamental distinction between actions that are executable by an agent given the circumstances and actions that are executable by an agent given her setting or intentions is modelled. This logic is a variant of the action logic on which the deontic system **ADL** proposed by Canavotto and Giordani in [6] is based. With respect to this system and to other action logics inspired by Propositional Dynamic Logic (PDL) and used in deontic logic (esp. [5, 7, 11]), one of the main conceptual novelties of **AL** is that, among the set of individual actions available to an agent at a given world, we specifically consider those that are compatible with her setting or intentions at that world.

The paper is structured as follows. In the next section, we introduce the basic intuitions on which our system is based and the main distinctions it aims at capturing. In section 3, we present the syntax and semantic of the action logic **AL**, and we prove a characterization theorem for it. Finally, section 4 concludes by pointing to some key developments.

[1] The precise way in which these criteria are specified and applied to concrete cases is a delicate object of discussion in legal theory (see [4] for an example). For our aims, however, an intuitive understanding of the general distinction between subjective and contextual criteria will suffice. We refer the interested reader to [8, ch. 5] and to the Model Penal Code to see how these distinctions are typically used in legal texts.

2 Framing the system

Our proposal is based on the idea that, in order to capture the notion of culpability, more distinctions than those drawn by standard action deontic logics need to be made. In order to introduce the conceptual elements characterizing our framework, let us consider a simple real-life situation.

Suppose that it is 7:30 in the morning and a man, John, while getting ready to go to the office, suddenly remembers that he and his wife promised to their lawyer, Mr Brown, that they would have brought some documents to his law firm by 8:00. They assured him that, if they could not make it in the end, they would have called him by 7:45 to postpone the meeting. In this situation, there are then three main things that John can do, namely: α_1, going straight to the office; α_2, calling the lawyer and postpone the meeting; α_3, going to the law firm with the documents. These three actions are *action types* that can be instantiated in several ways. In particular, we can suppose that John has two principal ways to go the law firm, *viz.* either by car or by bike. If he took the car, John would be at the law firm at 7:45; if he took the bike he would be there at 7:55.

As shown in figure 1, we can think of *instances of actions*, intended as action types, as transitions between possible worlds. By performing different actions, different *states* can be realized at different worlds. For example, in the figure, the state that John is at the law firm at 7:45 is realized at w_3 and the state that he is there at 7:55 is realized at w_4.[2]

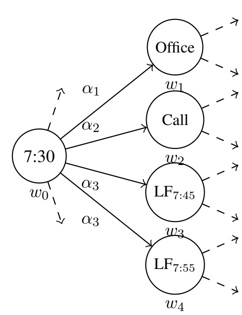

Figure 1: Action Types and Tokens

[2]Although in the literature about transition systems the terms "world" and "state" are used interchangeably, here we use them to express different concepts. Specifically, we use "state" to denote a state of affairs and "world" to denote a complete possible world, where a state of affairs can obtain at different possible worlds. Later on, we will model states as sets of worlds, i.e. the sets of worlds where the states obtain. In the semantics for **AL**, states will thus correspond to so-called UCLA propositions.

Given a certain possible world, we can distinguish two key senses in which an action can be performed by an agent at that world. To see this, imagine, on the one hand, that John's phone is broken. In this situation, the man cannot perform the action α_2 of calling Mr Brown and postpone the meeting, because there is a preventive factor, or *impediment*, in the actual world that prevents him from doing so, namely his phone's being broken. Since, *given the circumstances*, α_2 is not executable by John, the man has an *excuse* for not calling the lawyer in case he does not go to the law firm. In general, we will say that an action type β is *objectively possible* for an agent just in case there are no impediments for the agent to perform β, where, roughly, an impediment for an agent to perform β is any "non-mental" act or event that prevents the agent from currently performing β.[3]

On the other hand, imagine that there is nothing in the actual world preventing John from going to the law firm, but that he has an important video conference that he intends not to miss. Let us consider two possible scenarios.

- *Scenario 1.* The conference is at 9:30. If John went to the law firm, he would be in time for the conference, no matter whether he goes by car or by bike.
- *Scenario 2.* The conference is at 8:30. If John went to the law firm, he would miss the conference, no matter whether he goes by car or by bike.

Now, unless he changes his mind, John cannot perform any action that makes him miss the conference meeting, in the sense that executing an action of this sort is incompatible with his intention: in this case, fulfilling his intention excludes the possibility of performing any such action. Hence, *given his setting or intention*, it is possible for John to execute the action α_3 of going to the law firm in scenario 1, but not in scenario 2, even though in neither scenario there are impediments for him to perform this action. The two cases are illustrated in figure 2, where arrows represent instances of actions compatible with John's intention.

Note that, in neither scenario, the action of calling the lawyer is executable by John given his intentions. This depends on the fact that, since his phone is broken, this action is not executable by John at all. Furthermore, it is important to observe that the actions compatible with John's intention might not include the action that John will end up doing. In fact, something could prevent John from carrying out any of these actions (for instance, John might be involved in a car accident).

[3] Some examples: a traffic jam might be an impediment for the agent to catch a train; a disease might be an impediment for her to go to work; the lack of necessary means is an impediment for her to achieve her planned end. On the other hand: believing that it is wrong to assume drugs is not an impediment to assume drugs; the fact that a kid is convinced by her mother not to eat chocolate is not an impediment for her to eat chocolate; knowing that crimes are punished is not an impediment to commit a crime.

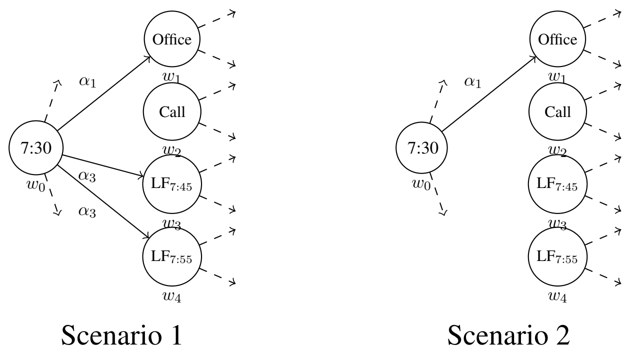

Figure 2: Specified scenarios.

In general, we will say that an action type, β, is executable by the agent *given her intentions*, just in case, besides being executable by the agent given the circumstances, it can also be performed by the agent in a way that is compatible with her setting.[4] In turn, a way to perform β is compatible with the agent's setting just in case it does not lead to a world where the agent has realised a state contrasting with her intentions. So, actions that are *not* executable by the agent given her setting are either objectively impossible for the agent (as action α_2 in our specified case study) or objectively possible for the agent but excluded in virtue of her setting (as action α_3 in scenario 2 of our specified case study). It is worth noting that, since it is possible that the setting of the agent has an impact not only on the current situation but also on all future ones, it can turn out that an action is *permanently* unexecutable by an agent given her setting.

We have now all conceptual elements we need to introduce the logic **AL**.[5]

3 The action logic $\mathbf{AL}$

The language $\mathcal{L}_{\mathbf{AL}}$ of the action logic $\mathbf{AL}$ includes two sets of expressions, namely a set $Tm(\mathcal{L}_{\mathbf{AL}})$ of action terms and a set $Fm(\mathcal{L}_{\mathbf{AL}})$ of formulas. Let $\mathcal{A}$ be a fixed set of action type variables. $Tm(\mathcal{L}_{\mathbf{AL}})$ is then built according to the following grammar:

$\alpha ::= a_i \mid 1 \mid \alpha \sqcup \alpha \mid \alpha \sqcap \alpha$

[4] We use the term "setting" to indicate the entirety of intentions that an agent has in a given situation. Hence, if an agent forms an intention to do an action α in a certain situation, then the setting of that agent in that situation will include an intention to do α.

[5] As mentioned in the introduction, the logic $\mathbf{AL}$ is a variant of the action logic used by [6]. The main differences are the intended interpretation of the action modalities $[\alpha]$ and the presence of the modal property of actions imp.

where $a_i \in \mathcal{A}$. Intuitively, 1 is the action type instantiated by any action whatsoever; $\alpha \sqcup \beta$ is the action type instantiated by any action instantiating either α or β; finally, $\alpha \sqcap \beta$ is the action type instantiated by any action instantiating α and β in parallel. We assume that an individual action can be a token of different types. Hence, saying that an action is a token of a_i does not exclude the possibility that it is also a token of a different type a_j..

Turning to the set of formulas of $\mathcal{L}_{\mathbf{AL}}$, let us fix a countable set $\mathcal{P}$ of propositional variables. Then, $Fm(\mathcal{L}_{\mathbf{AL}})$ is built according to the following grammar:

$\phi ::= p_i \mid \neg\phi \mid \phi \wedge \phi \mid [F]\phi \mid [1]\phi \mid done(\alpha) \mid imp(\alpha)$

where $p_i \in \mathcal{P}$ and $\alpha \in Tm(\mathcal{L}_{\mathbf{AL}})$. The other connectives and the dual modalities $\langle F \rangle$ and $\langle 1 \rangle$ are defined as usual. The intended interpretation of the modal formulas is as follows. $[F]\phi$ says that ϕ holds in all worlds that are accessible in the future from the current world, while $[1]\phi$ says that ϕ holds in all the worlds that the agent can reach by acting in a way compatible with her setting or intentions. Finally, $done$ and imp are modal properties of actions such that $done(\alpha)$ is true at all the worlds where the agent has just performed α and $imp(\alpha)$ is true at all the worlds where there are impediments for the agent to do α. As we will see in a moment, the modality $[1]\phi$ and the modal property $done(\alpha)$ can be used to define the familiar action modality $[\alpha]\phi$.

3.1 Semantics

The semantics for $\mathcal{L}_{\mathbf{AL}}$ is based on the idea that actions are action types that can be performed in different ways and, hence, be instantiated by different individual actions. We standardly model action types as binary relations over possible worlds. Thus, an individual action will correspond to a transition linking two worlds. As in [6], we conceive of actions as achievements and accomplishments in Vendler's classification (see [16]), or as acts and achievements in von Wright's conceptualization (see [17, 18]). On this conception, there is a perfect correspondence between worlds to which an action leads and worlds where *the state of affairs that the action has been done* is realized. Later on, we will rely on this correspondence to define actions in terms of states.

Definition 1 (Frame). *A frame for* $\mathcal{L}_{\mathbf{AL}}$ *is a tuple*
$F = \langle W, R_F, R_1, D, I \rangle$, *where*

- $W \neq \varnothing$ *is a set of possible worlds*
- $R_F : W \to \wp(W)$
- $R_1 : W \to \wp(W)$
- $D : Tm(\mathcal{L}_{\mathbf{AL}}) \to \wp(W)$
- $I : Tm(\mathcal{L}_{\mathbf{AL}}) \to \wp(W)$

Let us consider each element in turn. Firstly, R_F is a function that determines, for each world w, which worlds are accessible in the future from w. This function is characterized by the following conditions.

Conditions on R_F: for all $w, v, u \in W$
(a) $w \in R_F(w)$
(b) $v \in R_F(w) \Rightarrow R_F(v) \subseteq R_F(w)$

Intuitively, $R_F(w)$ is thus the cone containing the stages that are accessible from w.

Secondly, R_1 is the function that, for each possible world w, returns the outcomes of all the transitions starting at w which are compatible with the agent's intentions. Hence, intuitively, $R_1(w)$ is the set of worlds the agent can access by acting in a way that is compatible with her setting or intentions. We require that R_1 satisfies the following condition.

Conditions on R_1: for all $w \in W$
(a) $R_1(w) \subseteq R_F(w)$

Hence, worlds that an agent can access by executing an individual action compatible with her setting are worlds that can be accessed in the future. Observe that the condition on R_1 leaves the possibility open that, for some world w, $R_1(w) = \varnothing$. This means that there might be worlds where the agent's setting excludes the possibility of acting. This happens, for instance, when the agent has conflicting intentions.

Thirdly, D is the function that determines the set of worlds at which a given action has just been performed. Accordingly, for any action α, $D(\alpha)$ is the set of worlds where α has just been done by the agent. This function must satisfy three conditions, which provide a straightforward connection between the algebra of action types and the algebra of states corresponding to the instantiations of the action types:

Conditions on D**:**
(a) $D(1) = W$
(b) $D(\alpha \sqcup \beta) = D(\alpha) \cup D(\beta)$
(c) $D(\alpha \sqcap \beta) = D(\alpha) \cap D(\beta)$

Hence: (a) some action is instantiated at any stage, (b) instantiating the disjunction of two actions is the same as instantiating either the first or the second action, and (c) instantiating the conjunction of two actions is the same as instantiating both the first and the second action.

Finally, I is the function that determines the set of worlds where there are some impediments for the agent to do α. Hence, $I(\alpha)$ is the set of worlds where there are factors preventing the execution of α. This function is characterized by the following conditions.

Conditions on I: for each $w \in W$
(a) $I(1) = \varnothing$
(b) $I(\alpha \sqcup \beta) = I(\alpha) \cap I(\beta)$
(c) $I(\alpha \sqcap \beta) = I(\alpha) \cup I(\beta)$
(d) $w \in I(\alpha) \Rightarrow R_1(w) \cap D(\alpha) = \varnothing$

According to the conditions on I, (a) there are never impediments to perform all types of action, (b) there are impediments to perform $\alpha \sqcup \beta$ just in case there are impediments to perform both α and β, (c) there are impediments to perform $\alpha \sqcap \beta$ just in case there are impediments to perform either α or β. Finally, in line with the characterization provided in section 2, (d) if, in a certain situation, α is not executable by the agent given the circumstances, then, in that situation, α is not executable by the agent given her setting either (this reading of the consequent of (d) will become clear in a moment).

At this point, we are able to introduce the definition of the key functions of our action deontic logic.

Definition 2 (α-transitions)**.** *For every $\alpha \in Tm(\mathcal{L}_{\mathbf{AL}})$, R_α is a map $R_\alpha : W \to \wp(W)$ such that, for each $w \in W$, $R_\alpha(w) = R_1(w) \cap D(\alpha)$.*

R_α is a function that, for each possible world w, returns the outcomes of the transitions starting at w associated with α and compatible with the agent's intentions. More specifically, definition 2 tells us that the transitions associated with α and compatible with the setting of the agent are those transitions compatible with the setting of the agent which end in a world in which the agent has just done α. As we mentioned at the beginning of this section, the basic idea is that there is a perfect correspondence between worlds to which an action leads and worlds where *the state of affairs that the action has just been done* is realized. Crucially, note that the characterization of R_1, $done$ and imp allows for situations where $R_\alpha(w) = \varnothing$, even though $w \notin I(\alpha)$. This is essential to account for the fact that, in certain situations, no way of doing α is compatible with the setting of that agent, even though there is no factor preventing the agent from doing α (see the action of going to the law firm in scenario 2 of our case study).

Definition 3 (Model)**.** *A model for $\mathcal{L}_{\mathbf{AL}}$ is a tuple $M = \langle F, V \rangle$, where*

- *F is a frame for $\mathcal{L}_{\mathbf{AL}}$*
- *$V : \mathcal{P} \to \wp(W)$ is a standard valuation mapping propositional variables into the sets of possible worlds at which they are true.*

Definition 4 (Truth in a model)**.** *The notion of truth of a formula at a world in model for $\mathcal{L}_{\mathbf{AL}}$ is recursively defined as follows.*

$M, w \models p \;\Leftrightarrow\; w \in V(p)$
$M, w \models \neg\phi \;\Leftrightarrow\; M, w \not\models \phi$
$M, w \models \phi \wedge \psi \;\Leftrightarrow\; M, w \models \phi$ and $M, w \models \psi$
$M, w \models [F]\phi \;\Leftrightarrow\; \forall v \in W(v \in R_F(w) \Rightarrow M, v \models \phi)$
$M, w \models [1]\phi \;\Leftrightarrow\; \forall v \in W(v \in R_1(w) \Rightarrow M, v \models \phi)$
$M, w \models done(\alpha) \Leftrightarrow\; w \in D(\alpha)$
$M, w \models imp(\alpha) \Leftrightarrow\; w \in I(\alpha)$

The main operators of our action logic can now be explicitly defined.

Definition 5 (Action modalities)**.** $[\alpha]\phi := [1](done(\alpha) \to \phi)$
The dual modality $\langle\alpha\rangle\,\phi$ is defined accordingly.

Intuitively,$[\alpha]\phi$ says that ϕ is true at all the worlds that the agent can reach by executing any individual action of type α compatible with her setting. Hence, letting $\top$ be any tautology, the intended meaning of the formula $\langle\alpha\rangle\,\top$ is that the agent can perform α in a way that is compatible with her setting. The basic distinction between actions that are objectively possible for an agent and actions that are executable by an agent given her setting can then be expressed in our language by the distinction between $\neg imp(\alpha)$ and $\langle\alpha\rangle\,\top$. What is more, letting $\bot$ be any contradiction, actions that are permanently unexecutable by an agent given her setting can be characterized as those satisfying the formula $[F][\alpha]\,\bot$.

3.2 Axiomatization

The axiom system $\mathbf{AL}$ consists of the following four groups of axioms and rules.

Group 1: axioms and rules for $[F]$

A1.1 $[F](\phi \to \psi) \to ([F]\phi \to [F]\psi)$

A1.2 $[F]\phi \to \phi$

A1.3 $[F]\phi \to [F][F]\phi$

R1.1 ϕ / $[F]\phi$

Group 2: axioms and rules for $[1]$

A2.1 $[1](\phi \to \psi) \to ([1]\phi \to [1]\psi)$

A2.2 $[F]\phi \to [1]\phi$

Group 3: axioms for $done$

A3.1 $done(1)$

A3.2 $done(\alpha \sqcup \beta) \leftrightarrow done(\alpha) \vee done(\beta)$

A3.3 $done(\alpha \sqcap \beta) \leftrightarrow done(\alpha) \wedge done(\beta)$

Group 4: axioms for imp

A4.1 $\neg imp(1)$

A4.2 $imp(\alpha \sqcup \beta) \leftrightarrow imp(\alpha) \wedge imp(\beta)$

A4.3 $imp(\alpha \sqcap \beta) \leftrightarrow imp(\alpha) \vee imp(\beta)$

A4.4 $imp(\alpha) \to [1]\neg done(\alpha)$

Corollary 1. *The following propositions are derivable in* **AL***.*

C1.1 $[\alpha \sqcup \beta]\phi \leftrightarrow [\alpha]\phi \wedge [\beta]\phi$

C1.2 $[\alpha]\phi \vee [\beta]\phi \to [\alpha \sqcap \beta]\phi$

C1.3 $\langle\alpha\rangle \top \leftrightarrow \langle 1\rangle\, done(\alpha)$

Proof. Immediate from axioms of groups 3 and definition of $[\alpha]\phi$. □

According to **C1.1** and **C1.2**, our action modalities behave as standard action modalities in Dynamic Deontic Logic (see [11]). In addition, due to **C1.3**, the executability of an action by an agent given her setting, expressed by $\langle\alpha\rangle \top$, is to be distinguished from the objective concrete possibility the agent has to perform that action, expressed by $\neg imp(\alpha)$. In fact, while $\langle\alpha\rangle \top \to \neg imp(\alpha)$ is derivable, it is possible that $\neg imp(\alpha)$ holds, even if α is not executable by the agent given her setting.

Theorem 1. *The system* **AL** *is sound and complete with respect to the class of all models for* **AL***.*

Proof. The proof of soundness is straightforward. The proof of completeness follows from the proof of the fact that any $\mathbf{AL}$-consistent set of formulas is satisfiable in a model for $\mathcal{L}_{\mathbf{AL}}$, which in turn derives from the definition of a canonical model. The construction is as follows.

Definition 6 (Canonical model)**.** *The canonical model for $\mathcal{L}_{\mathbf{AL}}$ is the tuple*

$M^c = \langle W, R_F, R_1, D, I, V\rangle$

such that

- W *is the set of all maximal* $\mathbf{AL}$*-consistent sets of formulas of* $\mathcal{L}_{\mathbf{AL}}$
- $R_F : W \to \wp(W)$ *is such that* $v \in R_F(w) \Leftrightarrow w/[F] \subseteq v$*,*
  where $w/[F] = \{\phi \mid [F]\phi \in w\}$
- $R_1 : W \to \wp(W)$ *is such that* $v \in R_1(w) \Leftrightarrow w/[1] \subseteq v$*,*
  where $w/[1] = \{\phi \mid [1]\phi \in w\}$
- $D : Tm(\mathcal{L}_{\mathbf{AL}}) \to \wp(W)$ *is such that* $D(\alpha) = \{w \mid done(\alpha) \in w\}$
- $I : Tm(\mathcal{L}_{\mathbf{AL}}) \to \wp(W)$ *is such that* $I(\alpha) = \{w \mid imp(\alpha) \in w\}$
- $V : \mathcal{P} \to \wp(W)$ *is such that* $V(p) = \{w \mid p \in w\}$

The proof that the canonical model is indeed a model for $\mathcal{L}_{\mathbf{AL}}$ that verifies, at every world, all formulas belonging to that world is routine and is left to the reader. □

4 Applications and Developments

The action logic $\mathbf{AL}$ is a system in which basic *contextual criteria* required to assess whether or not an agent is responsible or culpable for not having done an action are accounted for. To be sure, suppose that we restrict our attention to actions the agent is able to perform, as it is often done in action deontic logics. Then, the formula $imp(\alpha)$ expresses the fact that the agent has an excuse for not doing α: despite her ability to do α, the actual circumstances keep her from doing it. Besides this, we have seen that $\mathbf{AL}$ also allows us to analyse the conduct of the agent by considering what she can do given her setting or intentions. Is this sufficient to account for *subjective criteria* involved in the assessment of her behaviour as well?

The answer to the above question is negative: by itself, the fact that an action is compatible with the agent's intentions is not sufficient to conclude that the agent really intends to do that action, in case she performs it. This depends on the fact that, using a famous expression introduced by [1], an individual action can be intentional under one description but not under others. Thus, for example, an instance of intentionally walking to a certain place might be an instance of hitting a bystander; yet, hitting a bystander while walking is something we typically do inadvertently, even when we do it in a way that is compatible with our intentions. In the language of our logic, this means that we cannot use the formula $\langle\alpha\rangle\top$ to single out actions that would be performed intentionally by the agent, if performed by her. For similar reasons, the formula $[1]done(\alpha)$ cannot be used to this end either. Intuitively, this formula says that, if the agent acted in a way compatible with her intentions, then she would necessarily end up doing α. But this can be true in a situation in which the agent does not even know that α is a necessary outcome of acting in accordance with her intentions. For instance, suppose that a doctor wants to give a usually effective cure to a patient, without knowing that this will act as a deadly poison on her. In this case, the doctor cannot act according to her intentions without poisoning the patient. Still, if she does so, we would hardly say that she poisoned the patient intentionally.

So, **AL**, by itself, is still too weak to be a suitable tool to study deontic notions involving the responsibility of the agent and, in particular, the notion of culpable not doing. But let us consider once again scenario 1 in the case study we discussed in section 2. Recall that, in this scenario, John has an excuse for not calling Mr Brown (since his phone is broken), but he does not have any excuse for not going to the law firm. In addition, going to the law firm would be compatible with his intention not to miss the video conference. Now, suppose that John, taking it for granted that his wife will bring the documents to Mr Brown, concludes that going to the law firm is unnecessary. When he decides not to go there, going there becomes incompatible with his intentions. The fact that John *sets himself to omit* to bring the documents to his lawyer thus induces a change in scenario 1, which makes it similar to scenario 2. Crucially, this change is such that, after it occurs, John can be said to *intend* to omit to go to the law firm, so that, if he acts in accordance with his intentions, he omits this action intentionally.

This reasoning suggests that we could account for an agent's intention to omit an action if we could represent the fact that the agent, in any situation, can change her setting or intentions. In fact, after the agent sets herself to omit an action, she can safely be said to intend to omits that action. But how could we improve **AL** so as to model the fact that an agent sets herself to omit an action? One promising and natural way to go is to make the system dynamic in the sense of Public Announcement and Dynamic Epistemic Logics (see [3, 2, 9, 12, 15]). The rough idea is that a change in the setting of the agent corresponds to an update in the set of individual actions compatible with her setting and, hence, in her overall acting situation. Changes in the agent's setting can thus be modelled as transformations leading from the model representing the agent's original acting situation to the model representing her updated acting situation. The definition of specific update procedures corresponding to the event that an agent sets herself to omit an action requires both a clarification of the concept of omission and a precise characterization of the event that an agent sets herself to omit an action. A full elaboration of this proposal will be presented in currently on-going and future work.

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