

Racism in Agent Societies: A Model Based on the Concept of Capability-Based Social Control Mechanism

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Abstract. *This paper builds both on S. Haslanger's conceptions of ideology and racism, and on Carmichael & Hamilton typology of racism, to formally introduce a model for racism in agent societies. Racism is modeled as a system of racist capability-based social control mechanisms, each composed of practices, attitudes, meanings, and material and power conditions that a variety of social groups adopt and handle, regarding some particular set of social groups, to the effect of disempowering the members of the latter groups, on the basis of racist criteria, with respect to the possibility of their participation in some part of the organization and functioning of the agent society they inhabit. Two main forms of racism are considered: overt racism and institutional (or structural, or systemic) racism. A case study formally models the racist foundation of the religious system of prototypical Brazilian colonial plantations.*

Keywords: *Agent societies. Ideological systems. Social capabilities. Social control mechanisms. Racism. Race-based religious ideologies.*

1. Introduction

This paper builds both on Sally Haslanger's *practice-theoretic* conceptions of *ideology* and *racism* [Haslanger 2017], and on the two basic forms of racism characterized by Stokely Carmichael and Charles V. Hamilton, *overt racism* and *institutional racism*, to formally introduce the concept of *racism* in agent societies.

For that purpose, the paper defines the concept of *capability-based social control mechanism* in agent societies, making use of the concepts of *ideology* and *organizational capability*, introduced in [Costa 2015] and [Costa 2020], respectively. *Racism* is formally defined, then, as a system of *racist capability-based social control mechanisms*.

The paper is structured as follows. Section 2 first reviews the concepts of *ideology* and *organizational capability*, as they apply to *agent societies*. Section 3 introduces *capability-based social control mechanisms* and its two main types of components: *capability check mechanisms* and *capability distribution mechanisms*.

Section 4 summarizes Haslanger's conceptions of *ideology* and *racism*, and extends accordingly our previous concept of *ideology*. Section 5 defines the concept that is the focus of the paper, *racism in agent societies*, in two types: *overt* and *systemic racism*.

Section 6 presents, as a case study, the formal characterization of the *racist foundation* of the religious system present in prototypical *Brazilian colonial plantations*. Section 7 is the Conclusion.

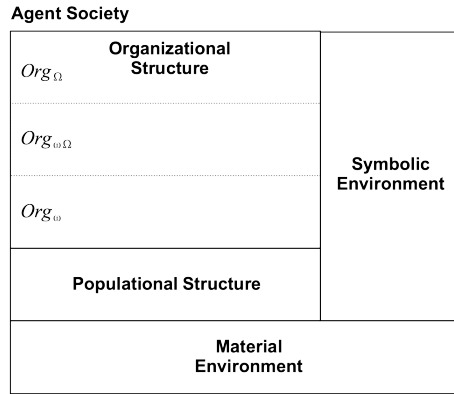


Figure 1. The main components of the *Agent Society* model.

2. Agent Societies

We call *Agent Society* the model of multiagent systems that we have been working on [Costa 2019]. The main components of the model are depicted in Figure 1, where:

- *Org* is the *organizational structure*, divided in three levels:
 - *Org*_ω, the micro-organizational level;
 - *Org*_μ, the mes-organizational level;
 - *Org*_Ω, the macro-organizational level;
- *Pop* is the *populational structure*;
- *SEnv* is the *symbolic environment*;
- *MEnv* is the *material environment*.

Table 1 lists the *elements* contained in the main components of the *Agent Society* model.

Table 1. The main elements of the architecture of agent societies.

Component	Main Elements
<i>Pop</i>	agents, agent networks
<i>Org</i>	<i>Org</i> _ω organizational roles
	<i>Org</i> _μ organization units
	<i>Org</i> _Ω social subsystems
<i>MEnv</i>	material objects
<i>SEnv</i>	symbolic objects

where the *organizational units* are structured sets of functionally connected *organizational roles* and the *social subsystems* are structured sets of functionally connected *organizational units*, so that the *micro-organizational level* is composed of a network of *organizational roles*; the *meso-organizational level*, of a network of *organizational units*; and, the *macro-organizational level*, of a network of *social subsystems*.

2.1. Social Groups and Organizations

A particular type of *Organizational Unit*, located in the meso-organizational level *Org*_μ, are the *social groups*.

We call *social group* a set of *organizational roles*, together with enough *structural and functional specifications* (e.g.: admissible behaviors and interactions, mandatory individual and/or collective goals to be achieved, internal functionalities to be maintained, etc.) that a set of *agents* of the populational structure may implement on the basis of their behaviors and interactions, each agent implementing one or more of those roles.

We distinguish the two main types of organization units, *social groups* and *organizations*, by fact that *organizations* are required to have their set of roles, and structural and functional specifications, formally stated in a *chart* that is independent of the identities and idiosyncrasies of the agents that implement the organization, while *social groups* are not submitted to such requirement, usually being highly dependent on those identities and idiosyncrasies.

Most clearly, as the internal complexities of the *social groups* increase, they may progressively structurally and functionally tend to become *organizations*, by progressively stabilizing their structure and functioning, by making them progressively independent of the identities and idiosyncrasies of the agents that implement them.

Social groups, *organizations*, and *agents* are the main generators, adopters, maintainers, and diffusers, of the *ideologies* that are effective in an agent society at any time.

2.2. Ideologies and Ideological Systems

We call *ideological system* [Costa 2015] the component of the *Symbolic Environment* of an agent society that stores and manages the set of *ideologies* that agents and organization units make use of in the decision processes regarding their social behaviors and interactions.

An *ideology* is a (not necessarily consistent) set of ideological frameworks, and an *ideological framework* is a set of ideological envisagements with which an agent or organization unit may classify and qualitatively identify and assess bodily and/or social or cultural features of other agents or organization units in order to decide on how to behave toward them.

The basic types of *ideological envisagements* introduced in [Costa 2015] are:

- *segmentation envisagements*, which allow for the segmentation of a population of agents and organization units into different social and organizational segments;
- *qualifying envisagements*, which allow for the hierarchization of the different populational and organizational segments according to their supposed competence for the performance of some activity;
- *valuation envisagements*, which allow for the hierarchization of the different activities that are performed in the agent society;
- *normative envisagements*, which allow for the imposition of norms (prohibitions, obligations, etc.) on agents and organization units regarding the different activities performed in the society.

These are envisagements of essentially *organizational* type. Other types of envisagements, like *ethical* or *political* ones, may be added to this set, as required by the applications.

We denote by *IdeoFrmwrks* the set of all *ideological frameworks* that can possibly be adopted by the agents and organization units of a given agent society.

3. Capability-Based Social Control Mechanisms

In general, the *social control* of a society indicates “*how people define and respond to deviant behavior*” [Black 1990, p. vii].

More specifically:

“*even in the most complex and differentiated societies of the modern world, legal activity constitutes only a small fraction of the social control in everyday life. All settings—whether families, organizations, occupations, neighborhoods, friendships, or gatherings of strangers—have their own forms of social control. It includes everything from rebukes to homicides, avoidance and exclusion, gossip, negotiation, and various modes of third-party intervention such as mediation, psychotherapy, and adjudication.*” [Black 1990, p. viii]

On the other hand, a *social mechanism* is:

“*a constellation of entities and activities, typically actors and their actions, that are linked to one another in such a way that they regularly bring about the type of phenomenon we seek to explain.*” [Hedström 2005, p. 2].

Thus, we take the *social control* of an agent society to be performed by a system of *social control mechanisms*, each constituted by an articulation of two types of *social mechanisms*, namely, *capability check mechanisms* and *capability distribution mechanisms*, which are articulated in the form that we explain presently.

We call *capability-based social control system* such system of capability-based social control mechanisms.

3.1. Capability Check Mechanisms

We call [Costa 2020] *capacity* of an agent any *behavior* or *interaction* that the agent is capable of performing or participating in, and *capability* any object (material or symbolic) that publicly certifies that a given agent is empowered with some determinate capacity.

Both types of organization units, *social groups* and *organizations*, make use of *organizational capabilities* to discriminate access to their membership process and to the social resources they control. That is, *organizations* and *social groups* often check the *capabilities* that are owned by an agent in order to *accept* it as one of its members or to *give it access* to some resource that they control.

Figure 2 shows the way *capability check mechanisms* operate in agent societies: an organization unit (*Organization unit k*) makes use of a *capability check mechanism* (*CC*) to check if an agent (*Ag*) has, in its capability list (*CL*) the capability that allows it to rightly enter the organization unit to implement one of its roles (capability *C_n* for *Role n*, for instance) in order to use some of the resources controlled by the organization unit (capability *C_j* for *Resource j*, for instance)¹.

Thus, *ideology-driven capability check mechanisms*, when checking the required capabilities according to the set of *ideological frameworks* adopted by the organization units, may privilege some agents over others regarding the access to the organizational roles or resources they control.

¹See [Costa 2020] for more additional features of *capability-based* social control mechanisms.

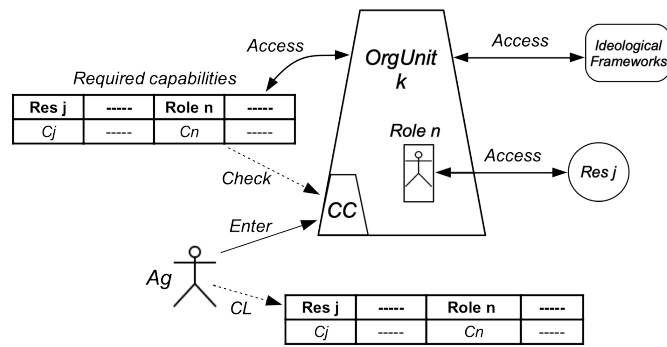


Figure 2. The way *capability check mechanisms* operate in agent societies.

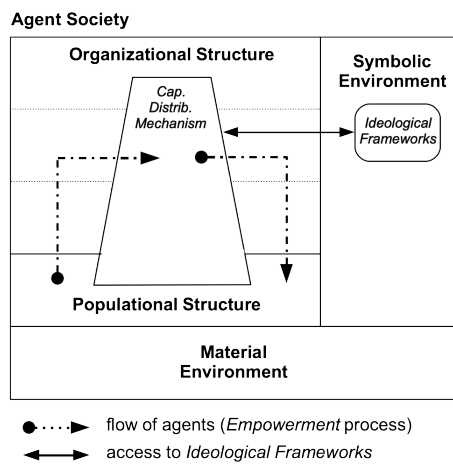


Figure 3. The way *capability distribution mechanisms* operate in agent societies.

3.2. Capability Distribution Mechanisms

Building on [Costa 2018] and the *agent-based version* of Bourdieu & Passeron's model of *class-oriented* schooling system [Bourdieu and Passeron 1990] that it sketched, we call *capability distribution mechanism* any *social control mechanism* that operates in such a way that, allowing a *flow of agents* through itself, assigns some capabilities to some of the agents in the flow while, at the same time, refusing them to others, to the effect of empowering the former and disempowering the latter with respect to the *capability-based access* to some particular type of organizational role or resource.

The *capability distribution mechanisms* are also *ideology-driven* in sense that they operate on the agents that flow through them on the basis of a set of *ideological frameworks* that drive them to privilege some of those agents over others, regarding the distribution of capabilities.

Figure 3 shows the general way in which *capability distribution mechanisms* operate in agent societies. Notice that, usually, the control of the very access to the *incoming agent flow* of a *capability distribution mechanism* is itself *capability-based*, in a functionally recursive way.

3.3. Systems of Capability Distribution Mechanisms

Clearly, the *recursive functional dependence* between interconnected *capability distribution mechanisms* implies the availability of *primitive capabilities* in the agent societies,

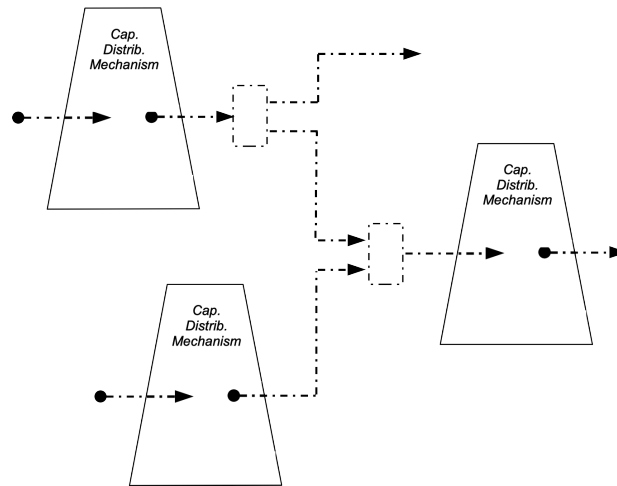


Figure 4. A sample system of capability distribution mechanisms.

i.e., features that are *not assigned* to the agents by any capability distribution mechanism but that can be used as *capabilities*².

We call *system of capability distribution mechanism* any set of capability distribution mechanisms that are functionally interconnected so that:

- the access to the incoming agent flow of a capability distribution mechanism depends on capabilities that are either *primitive* in the agents or *assigned* to them by other capability distribution mechanisms;
- there are *capability distribution mechanisms* that control their incoming agent flows only on the basis of *primitive capabilities*;
- the latter capability distribution mechanisms operate as *basic capability distribution mechanisms* in the recursive functional structure of the system.

Figure 4 shows a sample *system of capability distribution mechanisms*. The *dash-dotted rectangles* denote unspecified parts of the agent society through which the agents may flow while passing from one capability distribution mechanism to another.

3.4. Capability-Based Social Control Systems

We define the *capability-based social control system* of an agent society as the articulation of the *system of capability distribution mechanisms* of the society, denoted as *CapDistrMechs*, with the *set of capability check mechanisms* of the society, denoted as *CapCheckMechs*, which operate together on the *population* of the agent society in the manner indicated in Figure 5.

4. Haslanger’s Conceptions of Ideology and Racism

Sally Haslanger view that “*ideology is part of what gives people their tools of reasoning in the first place*” [Haslanger 2017, p.7] is fully compatible with the functional view of ideology that we have been adopting since [Costa 2015].

Adhering to Haslanger’s conception that *racism*, in particular, and *ideology*, in general, *is not* a set of beliefs, but “*is better understood as a set of practices, atti-*

²Which is the case, for instance, of *skin color* or *physiognomical traces*, for *overt* race-oriented social control mechanisms, as we consider in the next subsection.

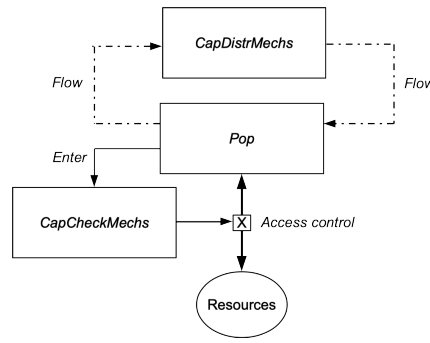


Figure 5. The structure of the *capability-based social control system* of agent societies.

tudes, social meanings, and material conditions, that systematically reinforce one another” [Haslanger 2017, p.1], we add to our previous notion of *ideology* the component of *practices*, which was lacking ³.

We do that by formally construing *practices* as *scripts* [Schank and Abelson 1977], i.e., sets of *behavioral and interactional schemes* that agents and organizational units may have to follow when behaving and interacting with each other.

Thus, we define an *ideology* in an agent society to be a *non-empty* structure of the form ⁴:

$$ideology \in \wp(IdeoFrmwrks) \circlearrowleft \wp(Practices) \circlearrowleft \wp(MatConds)$$

where $X \circlearrowleft Y$ is the (cartesian product-like) operation of *mutual reinforcement* between structures X and Y (an operation that we leave formally undefined, for now).

5. Racism in Agent Societies

5.1. The General Concept

As indicated in the *Introduction*, we model *racism* as a *racist capability-based social control mechanism*. That means a capability-based social control mechanism that is driven by *racist ideologies*.

We define a *racist ideology* as an ideology containing at least one *racist ideological framework*, i.e., an ideological framework containing at least one of the following *envisagements* that adopt *race* as a decisive criterion ⁵:

- a *qualifying envisagement* that takes *race* as the criterion for qualifying the agents or organization units regarding their competence for performing certain activities;
- a *valuation envisagement* that takes *race* as the criterion for valuating activities that are typical of certain segments of agents or organization units.

Additionally, we define a *capability-based social control mechanism* to be *racist* if it is driven by a *racist ideology*.

³In particular, “*practices depend on our ability to coordinate using shared meanings.*” [Haslanger 2017, p.14], which is precisely the coordinating function that we assign to *ideological frameworks*.

⁴ $\wp(X)$ is the *powerset* of the set X .

⁵Notice that we do not consider to be *racist* any *segmenting* or *normative* envisagement that takes *race* as its decisive criterion. Only envisagements that distinguish *qualifications* and *values* on the basis of *race* are considered to be *racist*. This allows for the non-racist character of *affirmative action* initiatives - see, e.g. https://en.wikipedia.org/wiki/Affirmative_action.

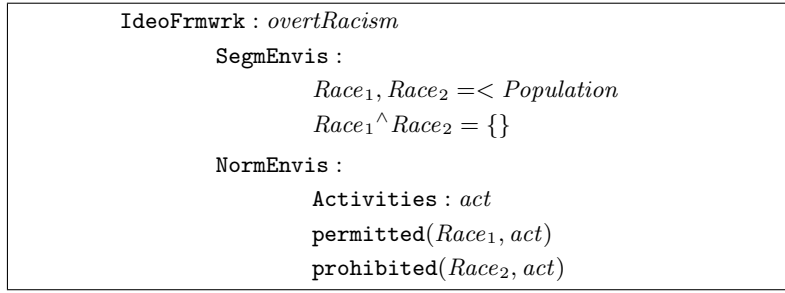


Figure 6. The *TinyIML* ideological framework that regulates the basic form of *overt racism*.

Racism in agent societies is defined, then, as a *system of racist capability-based social control mechanisms*, that is ⁶:

$$Racism \subseteq RacCapSocContrMechs \times RacIdeos$$

where:

- *RacCapSocContrMechs* is the set of *racist capability-based social control mechanisms* that may operate in the agent society;
- $RacIdeos = \wp(RacIdeoFrmwrks) \circ \wp(RacPractices) \circ \wp(MatConds)$ is the set of *racist ideologies* that may drive the racist social control mechanisms of *RacCapSocContrMechs*, with:
 - *RacIdeoFrmwrks* is the non-empty set of *racist ideological frameworks*;
 - *RacPractices* is the non-empty set of *racist scripts* ⁷;
 - *MatConds* is a non-empty set of *material conditions*, i.e., a non-empty set of networks of interacting material objects present in the *Material Environment* of the agent society;

In the following, we make use of the *TinyIML* ⁸, the ideology modeling language introduced in [Costa 2015], to characterize two general forms of racism: *overt racism* and *institutional* (or *structural*, or *systemic*) racism.

5.2. Overt Racism

Overt racism is racism writ large, in open air, essentially by *overtly prohibiting* people of certain races to perform certain behaviors or interactions, like: accessing certain public resources, addressing people of certain other races, etc.

Formally, we characterize the basic form of *overt racism* in *TinyIML* by means of the ideological framework in Figure 6.

Notice that, in *TinyIML*, *population segments* are *sets*, and the following are *set operations and relations*:

- =< the relation of *set inclusion*;
- ^ the operation of *set intersection*;
- { } the *empty set*.

⁶Compare this *ideology-based* conception of racism with the *polity-oriented* conception of racism by Carmichael and Hamilton: By “racism” we mean the predication of decisions and policies on considerations of race for the purpose of subordinating a racial group and maintaining control over that group. [Ture and Hamilton 1992, p.16].

⁷We leave undefined, here, the concept of *racist script*.

⁸We assume that the reading of *TinyIML* is well intuitive, so that no general account of its syntax and semantics is necessary here.

Remark that *agents* and *organization units* that adopt the ideological framework *overtRacism* take that:

- the *population* of the agent society is segmented into two segments, $Race_1$ and $Race_2$;
- that there is no agent that belongs simultaneous to the two segments;
- that an activity *act* is performable in the agent society;
- that agents of $Race_1$ are allowed to perform *act*, while those of $Race_2$ are not.

Remark also that, from the *functional point of view* of the ideological system of the agent society, the capability *race*, which segments the population and allows some of them to perform the activity *act*, is *not* a capability that was ideologically assigned to the agents, but a capability that is innate in them, and so operates as a *primitive capability*.

Finally, remark that the realization of *overt racism* can be directly modeled with the *capability check mechanism* of Figure 2, assuming that it has adopted the ideological framework *overtRacism* and that:

1. Any agent that attempts to perform the activity *act* from within the *Organization Unit k* (e.g., playing role *Role n* or accessing resource *Res j*) is checked by *CC* regarding the value of its capability *Race*.
2. If *Race* is valued $Race_1$, the agent is allowed to perform *act*.
3. If *Race* is valued $Race_2$, the agent is not allowed to perform *act*.

5.3. Institutional (or Structural, or Systemic) Racism

The term *Institutional racism* was introduced, in 1967, by Stokely Carmichael (aka Kwame Ture) and Charles V. Hamilton [Ture and Hamilton 1992] to denote the general form of *covert racism* embedded in the *institutions* of a given society. We take the terms *structural racism* and *systemic racism* to be equivalent to it⁹.

In the original formulation:

Racism is both overt and covert. It takes two, closely related forms: individual whites acting against individual blacks, and acts by the total white community against the black community. We call these individual racism and institutional racism. [...] The second type originates in the operation of established and respected forces in the society [...]. [Ture and Hamilton 1992, p.16]

The *connection* between *institutional racism* and *overt racism* was established by the recognition that the *racist attitude*:

permeates the society, on both the individual and institutional level, covertly and overtly. [Ture and Hamilton 1992, p.17]

which we interpret, as indicated in Section 3, as the recognition of the *recursive dependence* between the *ideology-driven* racist social control mechanisms and the *capability-based* ones, the latter serving as *primitive* mechanisms.

In terms of the *TinyIML* ideological constructs, *institutional racism* can be formalized as in Figure 7, where the expression with the form “ $X <_{act} Y$ ” means that, in general, the members of the populational segment X are *less capable* of performing the activity *act* than the members of the populational segment Y .

⁹See, e.g., https://en.wikipedia.org/wiki/Institutional_racism. See also [Almeida 2019] (in Portuguese).

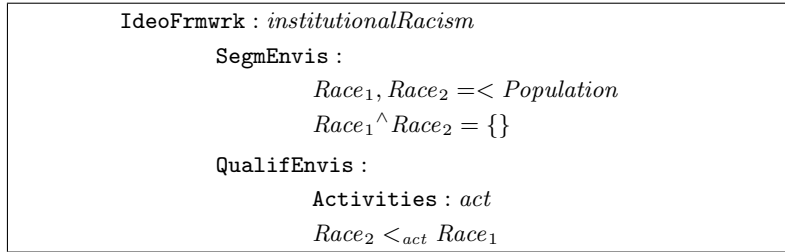


Figure 7. The ideological framework that regulates the basic form of overt racism.

The realization of this particular case of *institutional racism* can be directly modeled with the combination (in the way shown in Figure 5) of a *capability distribution mechanism* of the form shown in Figure 3 with a *capability check mechanism* of the form shown in Figure 2, assuming that both have adopted the ideological framework *institutionalRacism* and that the *capability check mechanism* operates as follows:

1. Any agent that attempts to perform the activity *act* from within the *Organization Unit k* (e.g., playing role *Role n* or accessing resource *Res j*) is checked by *CC* regarding the value of its capability *Race*.
2. If the value of capability *Race* of the agent is *Race₁*, the agent *ag* is allowed to perform *act*.
3. Agents with capability *Race* valued *Race₂* are allowed to perform *act* only if there are no agents with *Race* valued *Race₁* attempting to perform *act*.

Notice that a traditional and most important type of *institutional racism* is that embedded in the *legal systems* of societies, to the effect that the legal systems accept that individuals of a given race make implicit or explicit use of reasons based on *race differences* as legal defenses, when charged of some crime against an individual of a different race.

6. Case Study: The Racist Foundation of the Religious System of a Prototypical Brazilian Colonial Plantation

In this section, we formally model the racist foundation of the religious system of a prototypical slavery-based Brazilian colonial plantation.

Figure 8 summarizes the main parts of the *ideological framework* that composes the *religious system* of the prototypical slavery-based Brazilian colonial plantation that we have analyzed in [Costa 2016].

The *plantRelig* ideological framework states that:

- the *Population* of the plantation is composed of *Masters* and *Slaves*;
- *Masters* are better qualified to pray for *Saints* than *Slaves*;
- *Slaves* are better qualified to pray for *Orishas* than *Masters*;
- prays directed to *Orishas* are much less valuable than prays directed to *Saints*;
- *Masters* and *Slaves* are allowed to pray for *Saints* but not for *Orishas*.

The ideological framework *plantRelig* supports the *institutional racism* that impacts the religious activities in the plantation, to the effect that *Slaves* are not permitted to practice their religion, only that of the *Masters*.

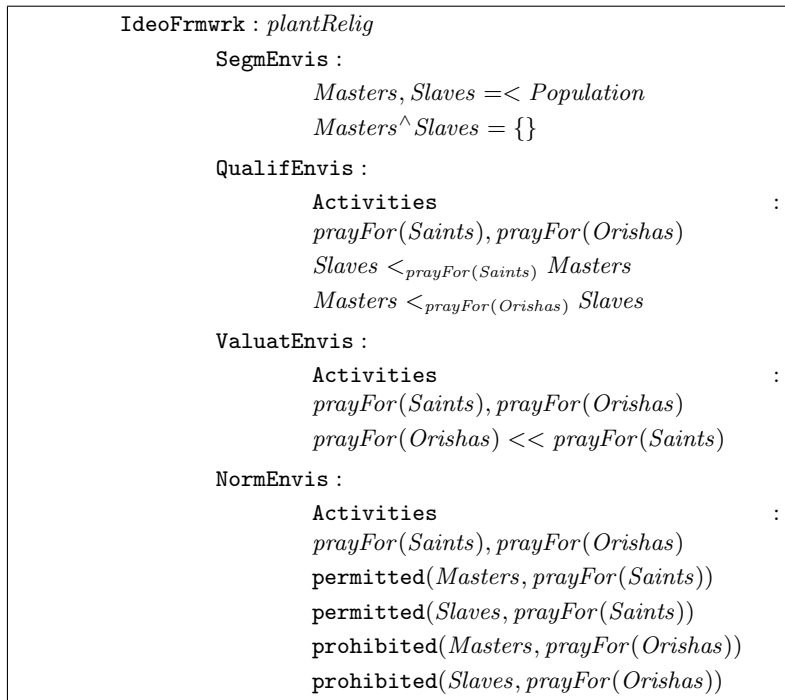


Figure 8. The *religious ideological framework* of the plantation.

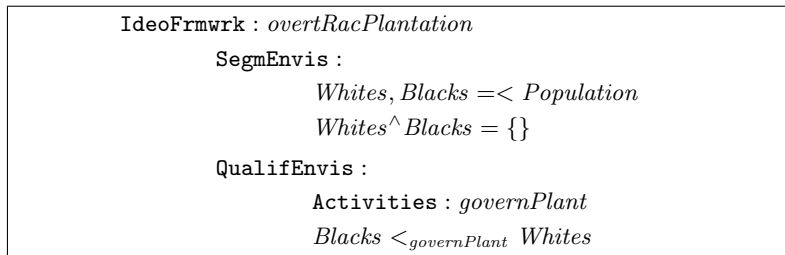


Figure 9. The *overt racism* underlying the *religious ideological framework* of the plantation.

Clearly, *plantRelig* is consistent and may even be considered sensible by those that accept the proposition stated by the *valuating envisagement*, namely, that:

$$\textit{prayFor}(\textit{Orishas}) \ll \textit{prayFor}(\textit{Saints})$$

which is implied by the assumption that the *Orishas* of the Afro-Brazilian cults are less valuable than the Catholic *Saints*.

But that proposition may be challenged. Here, we take that the *foundational reason* for the general acceptance of such *institutional* (religion oriented) form of racism in the prototypical Brazilian colonial plantations is the general acceptance in them of the *overt* form of racism given in Figure 9.

The Ideological framework *overtRacPlantation* states bluntly that *Masters* are more capable of *governing plantations* than *Slaves*, which implies that it is up to them to determine the activities (including religious activities) that are admissible in plantations.

7. Conclusion

This paper illustrated the viability of the use of the *agent society* model as a *formal semantic model* for social theories and concepts, as proposed in [Costa 2019]. It introduced an ideology-based model for *racism in agent societies*, making use of the previously defined concepts of *ideology* and *organizational capability* in agent societies. The basic ideological issues implied in *racism* were fully exposed through the use of the ideology modeling language *TinyIML*. The concept of *practices* was considered central to that model and *scripts* were proposed as the means to formalize them (which was let as a subject for future work). A case study illustrated the applicability of the proposed ideas.

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