



## ***A Social Network Approach to the Dual Aspect of Moral Competence***



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**Abstract:** This work presents evidence supporting the relationship between the dual aspect of moral competence (emotion and cognition) and social networks in school settings. We conducted empirical research with 160 students from various disciplines of the social sciences and different cohorts in two Brazilian public universities. Firstly, the participants responded to Georg Lind's Moral Competence Test (MCT-xt). Following this, a sociometric generator regarding relationships of friendship and collaboration in social networks was applied, and several Exponential Random Graphs Models (ERGMs), with the MCT-xt score as an exogenous effect and predictor of these relationships, were utilized. We also used a Crisp-Set Qualitative Comparative Analysis in order to determine if the cohorts, where the average MCT-xt was associated with the interactional structure, obeyed the same causal configuration. There exist two conditional configurations: (1) a sufficient score of MCT-xt in a social network with homogeneous status encourages a proactive search of collaboration; (2) an insufficient score of MCT-xt in a social network with homogeneous status encourages a collaborative exchange based on the popularity of some individuals. This work reveals how to interpret, at the grouping level, the results of MCT-xt.

**Keywords:** Moral competence; cognition; emotion; social networks analysis; MCT-xt.

## Introduction

Over the last 90 years, the psychology of moral development has established a robust research program, despite disagreements and revisions. Three researchers marked the direction and inflections of this program. After thorough observation of children's games with rules, Jean Piaget (1994) laid the theoretical foundations for conceptualising the emergence of moral consciousness. Assuming that morality is not innate, but is also not merely internalized, he identified that the transition from heteronomous submission to autonomous obedience presupposes the recognition of peer equality and the ability to put oneself in the other's shoes. The meaning of obedience changes when the subject assumes himself or herself to be a co-author of a norm in a situation of reciprocity that will affect all those involved. In this way, the rational equilibrium, or peer review, which makes scientific knowledge valid, echoes the values of a democratic society that tends toward a situation of normative stability.

Kohlberg (e.g., 1992) continued Piaget's work by refining the fundamental dichotomy between heteronomy and autonomy from a model of cognitive structures based on a three-level and six-stage scale. With a standardized interview method, in which the respondent must position themselves in the face of dilemmas involving axiological conflicts, Kohlberg's theory can identify qualitative leaps in how practical reasoning informs decision-making. However, the accumulation of evidence on the cognitive structures of morality did not shield the research program from critiques. On the one hand, there are concerns about the replicability of the laborious Kohlbergian interview method, and on the other, there are doubts about the theoretical equation between the cognitive stage and moral competence.

Georg Lind (1999) consolidated an alternative method – the Moral Competence Test (MCT). This standard MCT identifies the moral competence score, that is, the ability of subjects to evaluate counter-arguments based on their value, and not just on whether the argument supports the subjects' opinion. The MCT opened up new directions to the classical research cemented by Piaget and Kohlberg. The advantage was not only in methodological terms. Lind's suspicion about the incongruence between the cognitive stage and moral competence brought back a latent problem in the moral development research program: the dual aspect of moral competence.

### **1. The Dual Aspect of Moral Competence: A Classical Challenge in Social Sciences**

Before Piaget, Émile Durkheim (1999) insisted that the social fact par excellence, the moral authority of the group over the individual, had two faces or aspects; the coercive power, by which the social norm imposes restrictions on the individuals' interests and desires, and the attachment to a social group by which the individual finds it rewarding to

conform his/her behaviour to the group's values (Peterson 1974). In his classic view on child morality, Piaget (1932) examines Durkheim's sociological understanding, sharply criticizing what he considered the excessive heteronomy of Durkheimian sociology. According to Piaget, the distinction between mechanical and organic solidarity is a solution of quantitative rather than qualitative continuity in how individual consciousness emerges to cooperate with others. Piaget recognized Durkheim's contribution in seeking scientific explanations for a moral fact. However, he considered that the French sociologist is not clear enough when trying to capture the correspondence between the individual autonomous consciousness and the forms of cooperation in societies, whose division of labour is increasingly complex. Piaget's debate with Durkheim, which we will not delve into here, sheds light on how the emphasis on the evolutionary process of moral consciousness has neglected the dual nature of morality. According to Piaget (1994), emotion fuels action, while cognition provides the framework for decision-making.

Similarly, Kohlberg recognizes these two dimensions, distinguishing attitudes from the structures of moral cognition. For him, the deontological maturity of a person is not the simple compliance with norms but the ability to discern between conflicting values from internal principles. The capacity for discernment presupposes structures that operate as consistent totalities from articulated principles. In the face of analogous conflicts, the person should act coherently by choosing courses of action that he or she considers valid, compelling and fair.

As already mentioned above, Lind's MCT opened up new research perspectives. The advantage was not only in methodological terms. Lind's suspicion about the incongruence between the cognitive stage and moral competence brought back a latent problem in the moral development research program: the dual aspect of moral competence. In this vein, Lind's MCT-xt captures the parallelism hypothesis between emotion and cognition (Bataglia 2010), meaning that subjects at the post-conventional level (Stages 5 and 6) of moral development in Kohlberg's framework prefer the universal moral principles of this level. In contrast, individuals with low moral competence prefer the principles of the lower-level stages. However, a high level of cognitive structure cannot be confused with value (orientations, respectively) preferences. The concept of moral competence prevents a fundamental confusion between attitudinal conviction and the ability to give and receive good reasons for making decisions. From this view, a person could promote noble ideals but does so in a dogmatic way. For instance, if someone defends freedom of expression by using violence, this reveals a weak moral competence for giving and receiving rationally motivated arguments, i.e., not dogmatic. For Lind (2000), a high level of moral cognition does not correspond to robust moral competence. From Kohlberg's perspective, the subtle issue concerns a high level of moral cognition that embraces the preference for universal values (affective adherence to ideals) and the consistency of deontic judgment when facing circumstances. However, faith in values frequently blinds our capacity to give and receive good reasons elaborated by cognitive structures.

Krebs and Denton (2005) examined the Kohlbergian model from a pragmatic perspective. According to them, Kohlberg saw children and people as moral philosophers and moral judgement as intellectual individualist discernment when facing conflicting values. From their perspective, consequentialist judgements are low-stage solutions, but practical life requires instrumental solutions in the face of ethical contentions. Thus, Kohlberg's theory of moral stages results in an abstract Kantianism and the hypothetical imperatives are considered underdeveloped stages of morality. Instead, Krebs and Denton propose considering how people pursue their aims in a complex negotiation process in concrete situations. They adopt a broadly pragmatic approach, which does not acquire a strict philosophical sense like that of the pragmatic movement at the end of the 19<sup>th</sup> century. The general issue is how social interactions in different contexts condition personal decisions.

## **2. Research Problem**

We welcome the challenge of recognizing the dual aspect of moral competence and studying the practical contexts in which individuals activate their practical reasoning structures, which are the cognitive processes employed to make decisions in everyday situations. In this work, we used the Brazilian version of the MCT (MCT-xt adapted by Bataglia 2010) and analysed data gathered from subjects' interactions in college settings. Drawing on sociological imbrication studies, a field of sociology that examines how social structures and networks influence individual behaviour and decision-making (Granovetter 1973 and 1985), we consider moral decision-making to be a form of social action. Although the three moral dilemmas proposed in the MCT-xt are hypothetical scenarios that are solved individually, we can reconstruct the context of interaction or social circle in which the answer was given, in this case, the college world. Our findings indicate associations between MCT-xt scores and the exchange system in which the respondents participate.

Research using Lind's test in educational settings assumes that moral competence develops while it also needs to be taught and learned. As Hegazi and Wilson (2013) note, cognitive skill acquisition, maturity, and educational experience lead to the development of moral reasoning. However, according to these and other authors, moral reasoning may stagnate or even regress as students advance in their professional training (Feitosa et al. 2013a; Feitosa et al. 2013b; Hegazi & Wilson 2013; Martins, Santos, Bataglia, & Duarte 2021). They also report the existence of moral segmentation – a phenomenon that reveals systematic differences between scores of dilemmas – mostly in favour of the worker's dilemma and to the detriment of the physician's dilemma (see a summarized description of the dilemmas below). In line with Hegazi and Wilson (2013), there is no empirical evidence about the causes of these differences.

More than simply opposing the promotion of moral competence development,

studies advocate supporting students with methods and content that stimulate critical thinking and decision-making skills (Martins, Santos & Duarte 2021). These issues also caught Lind's attention (2019), who wondered whether it would be possible to teach moral competence and if so, how. From a broader perspective, this work aims to discuss the old Socratic problem of whether virtue can be taught. Our goal is not to evaluate the impact of schooling on the development of moral competence – there is already extensive scientific literature on the topic – but to provide evidence of the dual aspect of moral competence from the correspondence between MCT-xt scores and the interaction structures of students. The dual aspect of moral cognition may be an intervening factor in the observed results of stagnation, regression, and segmentation noted above. However, it is first necessary to find evidence that emotion and cognition operate differently from the context of action.

Our research focus can be expressed by the following question: How can any correspondence between moral competence, measured by MCT-xt, and the aspects embraced by it – emotion and cognition, be identified? In other words, this research aims to explore the relationship between moral competence, as measured by the MCT-xt, and the underlying components of emotion and cognition. Specifically, we want to investigate whether there is any correspondence between these factors.

### 3. Methods

The study involved 160 students from the humanities area in two Brazilian public universities. Some students were at the beginning, and others in the middle, of their college education, distributed respectively in two cohorts of psychology, social sciences and history undergraduate programs. Initially, the participants completed a form with questions about their academic semester, age, gender and religious affiliation. In the Brazilian context, religious affiliation is a sensitive factor that affects performance on the MCT-xt test (Bataglia 2010).

Subsequently, the students completed the adapted version of Lind's MCT test, called MCT-xt, which is an extended version (see Bataglia 2010 for details). The MCT-xt consists of three dilemmas involving axiological conflicts: should a couple of workers break into the office's boss (for which they could be fired) and steal evidence to prove that they are being spied on? (the workers' dilemma); should a doctor practice euthanasia (the physician's dilemma); and can a judge authorize torturing a suspect of a potential terrorist act to save lives (the judge's dilemma). For each situation, there are arguments both in favour and against, and the participants can agree or disagree. Based on the partial agreement and disagreement scores for each dilemma, the MCT-xt generates a standardized score between 0 and 100 using a kind of multivariate analysis.

The final step of the study involved the students responding to a sociometric generator, which aimed to capture the structure of interactions between cohort members in

two dimensions: friendship and academic collaboration. Sociologists consider friendship and cooperation as canonical processes when researching social networks (Krackhardt 1987; Lazega 2001). For this reason, we chose these relationships as interactional proxies for the aspects embraced by moral competence. Recognizing somebody as a friend appeals to an attitudinal emotion, and declaring somebody as a collaborative partner appeals to a practical task from this perspective.

## 4. Results

### 4.1 Descriptive results

| Cohort   | Number of participants |
|--|------------------------|
| Psychology 1 <sup>st</sup>                     | 25                     |
| Psychology 3 <sup>rd</sup> and 4 <sup>th</sup> | 29                     |
| Social Sciences 2 <sup>nd</sup>                | 30                     |
| Social Sciences 4 <sup>th</sup>                | 16                     |
| History 2 <sup>nd</sup>                        | 38                     |
| History 6 <sup>th</sup>                        | 22                     |
| Total  | 160                    |

Table 1: Participants in the study.

This table presents the number of participants in each cohort of the study, which included undergraduate students from Psychology, Social Sciences, and History programs in two Brazilian public universities. The total number of participants was 160, distributed among six cohorts based on their academic semester. The sample consisted of 57.7% females and 43% males, with females being the majority in the Psychology and Social Sciences cohorts, and males being the majority in the History cohorts. For model suitability and regarding religious affiliation, we excluded missing or non-response data and three reported cases of Agnostics and Buddhists due to the low number of observations, which accounted for less than 2%.

| Denomination      | Number of affiliated | Percentage | Valid percentage | Cumulative percentage |
|-------------------|----------------------|------------|------------------|-----------------------|
| Catholicism       | 42                   | 22.7       | 36.2             | 36.2                  |
| Spiritism         | 22                   | 11.9       | 19.0             | 67.2                  |
| Evangelism        | 17                   | 9.2        | 14.7             | 81.9                  |
| Other religion    | 17                   | 9.2        | 14.7             | 99.1                  |
| African religions | 14                   | 7.6        | 12.1             | 48.3                  |
| Agnosticism       | 3                    | 1.6        | 26               | 84.5                  |
| Buddhism          | 1                    | 0.5        | 0.9              | 100.0                 |
| Total             | 116                  | 62.7       | 100.0            |                       |
| Missing           | 69                   | 37.3       |                  |                       |
| Total             | 185                  | 100.0      |                  |                       |

Table 2: Religious affiliation of participants.

Table 2 shows the religious affiliation of the participants. Out of the total of 185 participants, 116 (62.7%) reported a religious affiliation, while 69 (37.3%) did not. The majority of those who reported a religious affiliation were Catholic (36.2%), followed by Spiritism (19.0%) and Evangelism (14.7%). Other religions accounted for 14.7%, and African religions for 12.1%. There were only three cases of agnosticism (2.6%) and one case of Buddhism (0.9%).

#### 4.2 Multivariate analysis

Three ANOVA models allowed us to investigate whether the distribution of the MCT-xt scores was associated with a cohort, sex, or religious affiliation. MCT is not a conventional test to diagnose individual characteristics. According to Lind,

The MJT [previous version of MCT] was not designed for and should not be used to make decisions about individual persons. A person's moral judgment behavior depends considerably on situational factors – like fatigue, involvement, prior experience. Therefore, an instrument for assessing an individual's degree of moral judgment competence must have built-in safeguards against misinterpretations, which the *MJT* does not have. However, when doing basic research or evaluations studies with *groups* of people, such situational factors mostly cancel out so that the average *C*-scores can be reliably interpreted as “true” level of moral judgment competence (Lind 1999, 18).

In its counterintuitive sense, the above caveat does not mean that collective factors magically disappear, but rather that the group affects individual performance. In other words, MCT-xt requires checking in terms of whether the group effect tends to average out the performance of individuals.

Before presenting the results of the variance models, we should note that the response variable – i.e., the MCT-xt score – was transformed by the natural logarithm scale in order to obtain a normal distribution that fits the assumptions of the variance analysis. Subsequently, we present the MCT-xt score (Table 4) and the distribution of the score by the natural logarithm (Figure 1).

|  | N  | Minimum | Maximum | Mean  | Standard Deviation | Variance |
|--|----|---------|---------|-------|--------------------|----------|
| Psychology 1 <sup>st</sup>                     | 25 | 0.30    | 32.90   | 12.80 | 7.34               | 53.89    |
| Psychology 3 <sup>rd</sup> and 4 <sup>th</sup> | 29 | 1.00    | 16.00   | 8.78  | 4.34               | 18.90    |
| Social Sciences 2 <sup>nd</sup>                | 30 | 3.20    | 67.70   | 19.84 | 13.42              | 180.10   |
| Social Sciences 4 <sup>th</sup>                | 16 | 2.50    | 36.20   | 12.98 | 9.11               | 83.16    |
| History 2 <sup>nd</sup>                        | 38 | 4.90    | 39.00   | 15.73 | 7.72               | 59.63    |
| History 6 <sup>th</sup>                        | 22 | 3.00    | 53.40   | 18.97 | 12.63              | 159.72   |

Table 3: MCT-xt C-core by cohort.

Table 3 suggests that there are variations in MCT-xt scores across different cohorts, with some cohorts having higher mean scores than others. For example, the Social Sciences 2<sup>nd</sup> cohort has the highest mean score (19.84), while the Psychology 3<sup>rd</sup> and 4<sup>th</sup>

cohort has the lowest mean score (8.78). The difference also varies across cohorts, with the Social Sciences 2<sup>nd</sup> cohort having the highest variance (180.10) and the Psychology 3<sup>rd</sup> and 4<sup>th</sup> cohort having the lowest (18.90).

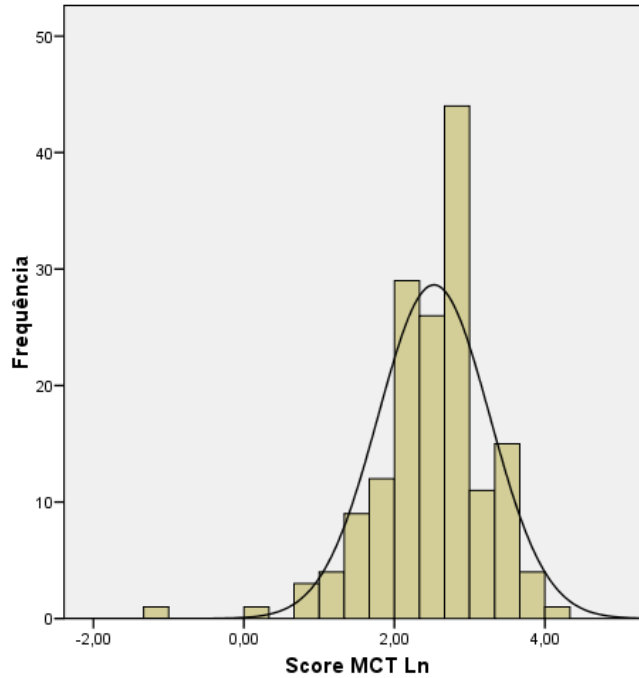


Figure 1: Distribution of score according to MCT-xt by Ln scale (SPSS v.14).

The ANOVA models, as shown in Tables 5 to 7, indicate that differences in MCT-xt scores are associated with cohorts and religious affiliation. However, sex is not a discriminating factor. According to Georg Lind’s observation, the cohort result expresses the central tendency of the intragroup. Simultaneously, the ANOVA model captures the effect of the group on individuals’ scores through the difference in group variances. In the ANOVA model of religious affiliation, one category aggregated the statements with a few observations, which do not have an expressive demographic profile in the Brazilian context – e.g., Buddhists. For both sex and religious affiliation, we worked with valid data, excluding the missing answers.

|                | Sum of squares | Df  | Mean square | F     | p-value |
|----------------|----------------|-----|-------------|-------|---------|
| Within groups  | 18.622         | 5   | 3.724       | 8.307 | 0.000   |
| Between groups | 69.046         | 154 | 0.448       |       |         |
| Total          | 87.668         | 159 |             |       |         |

Table 4: ANOVA\* – dependent variable: MCT-xt Ln; discriminant factor: cohorts. Note: \*Levene’s statistic 1.24; p value = 0.293.



|                | Sum of squares | Df  | Mean square | F     | p-value |
|----------------|----------------|-----|-------------|-------|---------|
| Within groups  | 0.663          | 1   | 0.663       | 1.190 | 0.277   |
| Between groups | 86.986         | 156 | 0.558       |       |         |
| Total          | 87.649         | 157 |             |       |         |

Table 5: ANOVA\* – dependent variable: MCT-xt Ln; discriminant factor: sex. Note: \*Levene’s statistic 2.34, p value = 0.128.

|                | Sum of squares | Df | Mean square | F     | p-value |
|----------------|----------------|----|-------------|-------|---------|
| Within groups  | 13.066         | 4  | 3.267       | 5.601 | 0.000   |
| Between groups | 55.403         | 95 | 0.583       |       |         |
| Total          | 68.469         | 99 |             |       |         |

Table 6: ANOVA\* – dependent variable: LN according to MCT-xt; discriminant factor: religion. Note: \*Levene’s statistic 0.540; p value = 0.707.

### 4.3 Random Exponential Graph Models (ERGM)

The study of interaction structures using graphical representation techniques (sociograms) has been gradually advancing with probabilistic tools that capture the dynamics of relationships among agents in a social system (Wasserman and Faust 1999; Lazega & Higgins 2014). The latest generation of these tools is referred to as random exponential models (ERGMs) or P\* (star). These indicate substructures beyond triads (Lusher & Robins 2013). Today, we have variations of these models for longitudinal and hierarchical analyses. After addressing the dilemmas proposed in the MCT-xt, each student answered a sociometric generator with two statements. The first statement aimed to reconstruct the circles of friendship and trust among all cohort members:

- *My circle of trust and friendship in the group (classroom x) consists of the following people: (you do not have to fill in all the blanks).*

The second statement enabled us to reconstruct their collaborative relationships in college activities:

- *When you need to go deeper into a subject that you are discussing or prepare for exams in a collaborative way, these are the colleagues from the group (classroom x) that you usually go to (you do not have to fill in all the blanks).*

With scores from MCT-xt and sociograms of friendship and collaboration relationships in the cohorts, we used ERGM to identify whether friendship and collaborative choices are associated with the moral competence level identified by the MCT-xt. Thus, we can better understand the involvement of moral competence in this social network. According to Wassermann & Pattison (1996) and Pattison & Robins (2002), the general formula for P\* is:

$$\Pr(X = x) = \frac{1}{k} = \exp \left\{ \sum_Q \lambda_Q Z_Q(x) \right\}$$

In this formula,  $X$  is the sample space or set of all possible variables, and  $x$  is the observed network.  $Pr$  is the probability of distribution of the graph, while  $Q$  represents the graph's configuration or substructure (dyad, triad, up star, etc.).  $Z_Q(x)$  is the number of  $Q$  configurations in the  $x$  network, and  $\lambda_Q$  is an associated parameter indicating the importance of  $Q$  in the model. Finally,  $k$  is a normalization constant, which implies that the sum of the probability of all graphs must be equal to 1. The equation works similarly to logistic regression in estimating the probability of whether a relationship can or cannot be observed (binary data), assuming the Markovian dependence on the predictive variables (conditional probability) and semi-dependence beyond triads.

In Table 7 we present the general description of the network's morphology, considering the overall cohesion of the graphs. The density denotes the proportion of observed relations over the possible total, and the score ranges from 0 to 1. For instance, concerning friendship in the Psychology 1<sup>st</sup> cohort, 28.4% of the potential relationships were observed – the network with the highest cohesiveness. The standard deviation and the average degree correspond to the concentration of connections at each node in the network. The last two metrics of centralization (in and out-degree) indicate the network's hierarchy level and allow us to understand the concentration of the average of the relation plexus in a few nodes. The two cohorts of Psychology are, by far, the networks where fewer students concentrate on many relationships with their peers. The score refers to the maximum centralization that would be the value 1 – a network where a single actor constitutes a centre over which all the others gravitate.

|  | Density | Ties | Standard deviation | Mean degree | Centrality out-degree | Centrality in-degree |
|--|---------|------|--------------------|-------------|-----------------------|----------------------|
| Psychology 1 <sup>st</sup>                     | 0.187   | 112  | 0.390              | 4.480       | 0.3698                | 0.2830               |
| Psychology 3 <sup>rd</sup> and 4 <sup>th</sup> | 0.284   | 215  | 0.451              | 7.679       | 0.3196                | 0.4733               |
| Social Sciences 2 <sup>nd</sup>                | 0.092   | 80   | 0.289              | 2.667       | 0.08                  | 0.11                 |
| Social Sciences 4 <sup>th</sup>                | 0.150   | 36   | 0.357              | 2.250       | 0.124                 | 0.267                |
| History 2 <sup>nd</sup>                        | 0.090   | 127  | 0.287              | 3.342       | 0.0460                | 0.1293               |
| History 6 <sup>th</sup>                        | 0.116   | 51   | 0.320              | 2.31        | 0.13                  | 0.13                 |

Table 7: Network 1; relationships of friendship and trust.

|  | Density | Ties | Standard deviation | Mean degree | Centrality out-degree | Centrality in-degree |
|--|---------|------|--------------------|-------------|-----------------------|----------------------|
| Psychology 1 <sup>st</sup>                     | 0.187   | 112  | 0.390              | 4.480       | 0.3698                | 0.2830               |
| Psychology 3 <sup>rd</sup> and 4 <sup>th</sup> | 0.229   | 173  | 0.420              | 6.179       | 0.3772                | 0.4925               |
| Social Sciences 2 <sup>nd</sup>                | 0.080   | 70   | 0.272              | 2.33        | 0.095                 | 0.13                 |
| Social Sciences 4 <sup>th</sup>                | 0.150   | 36   | 0.357              | 2.250       | 0.124                 | 0.267                |
| History 2 <sup>nd</sup>                        | 0.078   | 110  | 0.269              | 2.895       | 0.0584                | 0.1417               |
| History 6 <sup>th</sup>                        | 0.088   | 39   | 0.284              | 1.773       | 0.11                  | 0.21                 |

Table 8: Network 2; relationships of collaboration.

Each generator allows one graph for each cohort to be drawn. Thus, we have 12 graphs in total, but due to the space limitations of this article, we only present the first two, corresponding to the Social Sciences 2<sup>nd</sup> cohort.

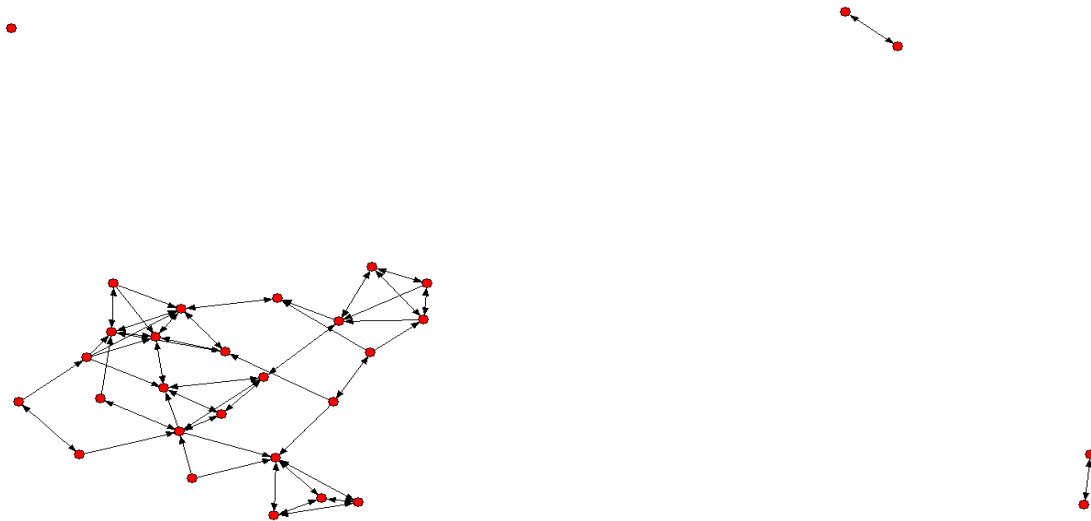


Figure 2: Social Sciences 2<sup>nd</sup> – relations of friendship and trust (UCINET 6.735).

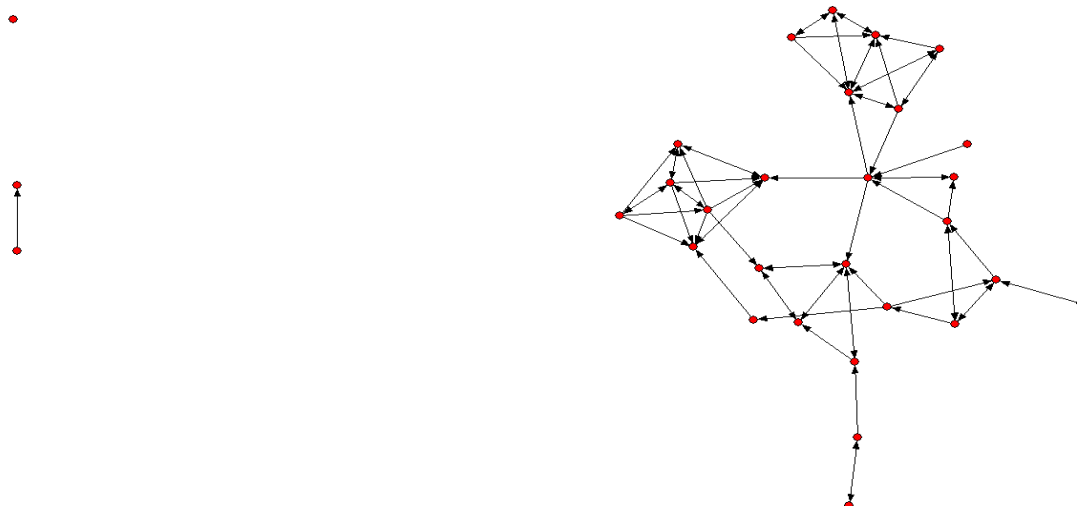


Figure 3: Social Sciences 2<sup>nd</sup>, relations of collaboration (UCINET 6.735).

The previous graphs allow us to better understand the similarity in density between friendship and collaboration relationships. In both cases, there is a significant component of interconnected students, with one isolated individual and two loose dyads of friendship, and one loose dyad and one isolated individual in collaboration exchanges. However, the relationships in the main component differ. Each graph is like a snapshot of a group of students at a particular moment in life. A longitudinal follow-up could be possible, but this is beyond the scope and resources of the present work.

Each graph, representing an interaction structure, was modelled endogenously and exogenously. The first perspective aims to understand how social dynamics explain the formation of ties, i.e., the ERGM models allow us to capture whether reciprocal and transitive configurations explain the observed data. The second perspective seeks to determine whether moral competence predicts students' friendships and collaborative choices, as measured by the MCT-xt score. In other words, we wanted to investigate whether cognitive competence operates as a non-explicit criterion of the exogenous formation of stated ties. Tables 9 to 14 depict both perspectives.

We draw attention to the fact that our inquiry will only focus on the results of exogenous models, that is, where the MCT-xt score- operates as a predictor of relationship formation, be it friendship or collaboration. The results of the endogenous models will not be the object of analysis. Explaining the interaction dynamics that generate as a result a certain structure in the friendship or collaboration networks is not the scope of this work. Every interaction network could be the fruit of configurations at various levels, dyadic (i.e., reciprocity), triadic (i.e., transitivity) and supra-triadic (i.e., social circuit). The following results make it clear that in each cohort a collaboration or friendship network emerges from specific configurations on the three levels. However, as said before, we are not focused on interpreting these results, since it would imply contrasting them with ethnographic observations on the school life of each of the school groups, which may be the object of future works.

In each table, we have highlighted in grey tone the exogenous effects, which correspond to the effect of the MCT-xt score on the formation of relations. The analysis is focused only on the statistically significant results of these effects.

| Psychology 1 <sup>st</sup> |           |       | Psychology 3 <sup>rd</sup> and 4 <sup>th</sup> |                    |           |       |         |
|----------------------------|-----------|-------|--|--------------------|-----------|-------|---------|
| Endogenous effects         | Parameter | Std   | t-ratio  | Endogenous effects | Parameter | Std   | t-ratio |
| ArcA                       | -2.4834   | 1.015 | -0.021*  | ArcA               | -4.612    | 0.66  | 0.055*  |
| ReciprocityA               | 2.4291    | 1.073 | 0.009*   | ReciprocityA       | 5.0223    | 0.84  | 0.044*  |
| In2StarA                   | 0.0601    | 0.089 | -0.004   | Out2StarA          | 0.1147    | 0.041 | 0.058*  |
| Out2StarA                  | 0.109     | 0.047 | -0.027*  | T2A                | 0.1925    | 0.022 | 0.059*  |
| TwoPathA                   | -0.1606   | 0.063 | -0.014*  | T6A                | -0.4456   | 0.076 | 0.053*  |
| T7A                        | -0.0091   | 0.084 | 0.01   | AinSA              | -0.0177   | 0.468 | 0.058   |
| T8A                        | -0.0823   | 0.077 | 0.024  | ATA-D              | -0.2086   | 0.18  | 0.055   |
| AinSA                      | -0.3131   | 0.652 | -0.018   | ATA-U              | 1.0579    | 0.243 | 0.055*  |
| ATA-D                      | 0.3771    | 0.251 | -0.028   | Exogenous effects  |           |       |         |
| ATA-U                      | 0.5878    | 0.255 | -0.022*  | MCTxt_SenderA      | 0.0003    | 0.002 | 0.078   |
| Exogenous effects          |           |       |  | MCTxt_ReceiverA    | -0.0017   | 0.002 | 0.061   |
| MCTxt_SenderA              | 0.0008    | 0.001 | -0.051   |                    |           |       |         |
| MCTxt_ReceiverA            | 0         | 0.001 | -0.028   |                    |           |       |         |

Table 9: ERGM: relations of friendship and trust in two cohorts of Psychology Students (PNet). Note: \*Significant by test of Wald: parameter twice standard deviation.

| Social Sciences 2 <sup>nd</sup> |           |       |         | Social Sciences 4 <sup>th</sup> |           |       |         |
|---------------------------------|-----------|-------|---------|---------------------------------|-----------|-------|---------|
| Endogenous effects              | Parameter | Std   | t-ratio | Endogenous effects              | Parameter | Std   | t-ratio |
| Arca                            | -41.733   | 0.266 | 0.026*  | Arca                            | -4.1583   | 0.749 | -0.056* |
| ReciprocityA                    | 43.791    | 0.49  | 0.011*  | ReciprocityA                    | 4.3184    | 0.928 | -0.036* |
| ATA-D                           | 0.4996    | 0.08  | -0.021* | Transitive-Triada               | -3.2908   | 1.326 | 0.004*  |
| Exogenous effects               |           |       |         | AinAoutsA                       | -0.2462   | 0.672 | -0.044  |
| MCT-xt_SenderA                  | 0.0134    | 0.011 | 0.064   | ATA-T                           | 4.5271    | 1.502 | 0.011*  |
| MCT-xt_ReceiverA                | -0.0093   | 0.012 | 0.05    | Exogenous effects               | -0.0045   | 0.003 | -0.088  |
|                                 |           |       |         | MCT-xt_ReceiverA                | 0.0066    | 0.003 | -0.070* |

Table 10. ERGM: relations of friendship and trust in two cohorts of Social Sciences students (PNet). Note: \*Significant by test of Wald: parameter twice standard deviation.

| History 2 <sup>nd</sup> |           |       |         | History 6 <sup>th</sup> |           |       |         |
|-------------------------|-----------|-------|---------|-------------------------|-----------|-------|---------|
| Endogenous effects      | Parameter | Std   | t-ratio | Endogenous effects      | Parameter | Std   | t-ratio |
| Arca                    | -4.1893   | 0.373 | 0.072*  | Arca                    | -27.037   | 0.409 | -0.01*  |
| ReciprocityA            | 3.4047    | 0.305 | 0.057*  | ReciprocityA            | 32.691    | 0.507 | -0.025* |
| AinAoutsA               | 0.7339    | 0.327 | 0.077*  | Out3StarA               | -0.0762   | 0.114 | 0.026   |
| ATA-C                   | 0.5671    | 0.100 | 0.068*  | Exogenous effects       |           |       |         |
| Exogenous effects       |           |       |         | MCT-xt_SenderA          | 0.0032    | 0.013 | -0.016  |
| MCT-xt_SenderA          | -0.0026   | 0.002 | 0.051   | MCT-xt_ReceiverA        | -0.0064   | 0.012 | -0.026  |
| MCT-xt_ReceiverA        | 0.0024    | 0.002 | 0.039   |                         |           |       |         |

Table 11. ERGM: relations of friendship and trust in two cohorts of History students (PNet). Note: \*Significant by test of Wald: parameter twice standard deviation.

| Psychology 1 <sup>st</sup> |           |       |         | Psychology 3 <sup>rd</sup> and 4 <sup>th</sup> |           |       |         |
|----------------------------|-----------|-------|---------|--|-----------|-------|---------|
| Endogenous effects         | Parameter | Std   | t-ratio | Endogenous effects                             | Parameter | Std   | t-ratio |
| ArcA                       | -2.1231   | 1.216 | -0.063  | ArcA   | -2.8255   | 0.94  | 0.012*  |
| ReciprocityA               | 1.9481    | 1.119 | -0.032  | Reciprocity A                                  | 3.8892    | 0.518 | 0.013*  |
| Out2StarA                  | 0.1218    | 0.055 | -0.018* | Out2StarA                                      | 0.14      | 0.027 | 0.009*  |
| TwoPathA                   | -0.1651   | 0.068 | -0.081* | T4A  | 0.4675    | 0.087 | -0.014* |
| T7A                        | 0.0058    | 0.088 | -0.053  | T7A  | -0.1405   | 0.055 | 0.008*  |
| T8A                        | -0.0538   | 0.082 | -0.072  | T8A  | -0.1612   | 0.038 | 0.033*  |
| AinSA                      | -0.0647   | 0.532 | -0.068  | AinSA  | -0.3295   | 0.572 | 0.008   |
| AoutSA                     | -0.3335   | 0.574 | -0.064  | ATA-D  | 0.0656    | 0.189 | 0.01    |
| ATA-D                      | 0.3207    | 0.267 | -0.057  | ATA-U  | 0.6531    | 0.205 | -0.001* |
| ATA-U                      | 0.6585    | 0.255 | -0.057* | Exogenous effects                              |           |       |         |
| Exogenous effects          |           |       |         | Score MCT-xt_                                  |           |       |         |
| MCT-xt_SenderA             | 0.0013    | 0.001 | -0.046  | Score MCT-xt_                                  | -0.0005   | 0.001 | 0.006   |
| MCT-xt_Score_ReceiverA     | 0         | 0.001 | -0.073  | Score MCT-xt_                                  | -0.002    | 0.001 | 0.032   |
| MCT-xt_Score_              | -0.001    | 0.001 | -0.076  | ReceiverA                                      |           |       |         |
| DifferenceA                |           |       |         |  |           |       |         |

Table 12: ERGM; relations of collaboration in two cohorts of Psychology students (PNet). Note: \*Significant by test of Wald; parameter twice standard deviation.

| Endogenous effects |  | Parameter | Std   | t-ratio | Endogenous effects |         | Parameter | Std     | t-ratio |
|--------------------|--|-----------|-------|---------|--------------------|---------|-----------|---------|---------|
| Arca               |  | -41.544   | 0.303 | -0.025* | Arca               | -32.979 | 0.7       | 0.022*  |         |
| ReciprocityA       |  | 26.147    | 0.466 | -0.055* | ReciprocityA       | 47.655  | 1.005     | 0.085*  |         |
| ATA-T              |  | 11.352    | 0.152 | 0.028*  | Out3StarA          | -12.034 | 0.443     | -0.024* |         |
| Exogenous effects  |  |           |       |         | Transitive-Triada  | 0.5431  | 0.115     | 0.036*  |         |
| MCT-xt_SenderA     |  | 0.0808    | 0.027 | -0.034* | Exogenous effects  | -0.0264 | 0.044     | -0.01*  |         |
| MCT-xt_ReceiverA   |  | 0.0003    | 0.011 | -0.041  | MCT-xt_SenderA     | 0.0636  | 0.026     | -0.071* |         |
| MCT-xt_DifferenceA |  | -0.0038   | 0.011 | 0.04    | MCT-xt_ReceiverA   |         |           |         |         |
| MCT-xt_Out2StarA   |  | -0.0354   | 0.01  | -0.004* |                    |         |           |         |         |

Table 13: Relations of collaboration in two cohorts of Social Sciences students (PNet). Note: \*Significant by test of Wald: parameter twice standard deviation.

| History 2 <sup>nd</sup> |  | Parameter | Std   | t-ratio | History 6 <sup>th</sup> |         | Parameter | Std     | t-ratio |
|-------------------------|--|-----------|-------|---------|-------------------------|---------|-----------|---------|---------|
| Endogenous effects      |  |           |       |         | Endogenous effects      |         |           |         |         |
| Arca                    |  | -3.6078   | 0.249 | -0.057* | Arca                    | -27.522 | 0.806     | -0.012* |         |
| ReciprocityA            |  | 1.7117    | 0.372 | -0.043* | ReciprocityA            | 48.361  | 0.903     | -0.001* |         |
| ATA-T                   |  | 1.1773    | 0.128 | -0.028* | A2PA-T                  | -0.6869 | 0.186     | -0.037* |         |
| Exogenous effects       |  |           |       |         | Exogenous effects       |         |           |         |         |
| MCT-xt_SenderA          |  | 0.0016    | 0.002 | -0.004  | MCT-xt_SenderA          | 0.0356  | 0.015     | 0.066*  |         |
| MCT-xt_ReceiverA        |  | 0.0036    | 0.001 | 0.073*  | MCT-xt_ReceiverA        | 0.0382  | 0.015     | -0.054* |         |
| MCT-xt_DifferenceA      |  | -0.0021   | 0.001 | 0.057   | ProductReciprocityA     | -0.0049 | 0.002     | 0.015*  |         |
| MCT-xt_Out2StarA        |  | -0.0027   | 0.001 | -0.018* |                         |         |           |         |         |

Table 14: Relationships of collaboration in two cohorts of History Students (PNet). Note: \*Significant by test of Wald: parameter twice standard deviation.



**5. Results of ERGMS**

The twelve ERGM models, which were based on two sociometric generators for six cohorts, allowed us to examine the association between the MCT-xt score and friendship and collaboration choices. Our focus was on the exogenous component of the models, where the MCT-xt score served as a predictor of these relationships among students. Specifically, a higher MCT-xt score was associated with a greater probability of choosing a friend or collaborator. We found that only one cohort showed a statistically significant association between the MCT-xt score and friendship, while four showed a statistically significant association between the MCT-xt score and collaborative relationships (Table 15). This fact suggests a dissociation between moral competence and friendship choices, and an association between moral competence and collaborative relationships. That is, moral competence is a weak predictor of choices guided by affective empathy, while it is a strong predictor in the case of practical demands involved in cooperative tasks. If we suppose that friendship is not necessary for collaboration, we could infer a practical link between moral competence and collaborative engagement. In this perspective, the filial affect would not depend on the capacity for moral judgement, while collaboration would be attached to practical tasks depending on a high degree of moral competence.

|                                     | Friendship                               | Collaboration  |
|-------------------------------------|--|--|
| Cohorts not associated with MCT- xt | 5/6                                      | 2/6  |
| Cohorts associated with MCT- xt     | 1/6<br>(Receiver in Social Sciences 4th) | 4/6<br>(Sender in Social Sciences 2nd and History 6th)<br><br>(Receiver in Social Sciences 4th, History 2nd and History 6th) |

*Table 15: Association between moral competence (MCT-xt score) and relations of friendship and collaboration in six cohorts of college students.*

Looking in more detail, it is possible to observe which forms of interaction are associated with the MCT-xt score in the analysed networks (Table 15). For that, we only consider each network’s positive and significant coefficients because they reveal that the higher the MCT-xt score, the more the tendency to establish relationships. Negative coefficients indicate a trend not to establish relationships. We want to highlight that the exogenous effects of the ERGM models – initiative, popularity and reciprocity – are associated with a higher MCT-xt score. In some cohorts, the MCT-xt score predicted the initiative to choose collaborators; in others, it indicated the chances of being chosen. Only in the Social Sciences 4<sup>th</sup> cohort was it revealed that having a high MCT-xt score is a predictor of being referred to as a friend.

Concerning collaboration, our data indicates the association between the MCT-xt

score and collaborative choices in four cohorts. In the Social Sciences 2<sup>nd</sup> and History 6<sup>th</sup> cohorts, students with a high MCT-xt score tended to look for partners to collaborate with. In the Social Sciences 4<sup>th</sup>, History 2<sup>nd</sup> and History 6<sup>th</sup> cohorts, having a high MCT-xt score is a predictor of being nominated as a collaborative partner. Only one cohort, History 6<sup>th</sup>, revealed that a high MCT-xt score is a predictor of collaborative reciprocal relationships.

## **6. Crisp-Set Qualitative Comparative Analysis on the Cases of Interest**

To preliminarily explain these results, we modelled a qualitative comparison based on four forms of association: (1) receiver in friendship, (2) sender in collaboration, (3) receiver in collaboration, and (4) reciprocity in collaboration. We analysed these findings using a Crisp-Set Qualitative Comparative Analysis (csQCA) model. This approach is suitable for comparing, from a logical and Boolean algebra view, causal factors that are understood as necessary or sufficient conditions for some instances of interest (Rihoux & Ragin 2009). To do so, we considered three causal factors of a qualitative nature, with which we compared the association described above. Here are the criteria we used to construct a table of binary values:

1. Having or not having an acceptable score for moral competence in the MCT-xt scale. Lind (mimeo) observes that a score above 20 marks this threshold.

2. Having or not having a network with high out-degree centrality. The standard algorithm to consider centrality goes from 0 to 1, with the maximum value being the situation in which a single node has relationships with all the others and constitutes itself as the network centre. Since finding a cohort with this characteristic is unrealistic, we adopted 0.5 as a criterion to consider the network as hierarchical, 0.1 as non-hierarchical, and 0.3 as an approximation point. From this score onwards, it becomes clearer that few nodes stand out as hubs of many relationships. Thus, we refrain from using a criterion of central tendency (mean or median), which does not express the qualitative reality of the concept we want to operationalize.

3. Having or not having a network with high in-degree centrality. The qualitative reasoning is the same as the one we expounded for out-degree centrality.

These three qualitative criteria enable the comparison of the six cohorts and allow us to determine whether the associations found are related to the level of moral competence and the hierarchical networks of friendship and collaboration. The four binary truth tables are available in the technical annex for consultation and correspond

to the four cases of interest. In this model, endogeneity was prevented by ensuring that the instances of interest were the conjunction of the MCT-xt score with friendship or collaboration relationships, while the explanatory factors corresponded to qualitative distinctions within these factors.

We used the Tosmana program (1.61) for the comparative analysis. After excluding logical contradictions, we highlight two valid results:

1. The association between collaboration and moral competence scores in the receiver mode for Social Sciences 4<sup>th</sup>, History 2<sup>nd</sup> and History 6<sup>th</sup>, depends on the following causal factors:

$$\text{Hierarchy out-degree } \{0\} * \text{Hierarchy in-degree } \{0\} * \text{MCT- xt } \{0\}$$

This result means that the association between MCT-xt and popularity, i.e., the receiver effect in collaboration, is conditioned to a non-hierarchical network for both out-degree and in-degree and also to an insufficient average of moral competence. In other words, our findings suggest that there is a link between the collaboration and moral competence scores in the receiver mode for Social Sciences 4<sup>th</sup>, History 2<sup>nd</sup>, and History 6<sup>th</sup>, assuming non-hierarchical networks for both out-degree and in-degree, and an insufficient average of moral competence, reflected by an MCT-xt score of 20 or lower. However, the lower average of moral competence in these groups does not hinder us from observing collaborative relationships attracted by individuals with higher MCT-xt scores.

2. The association between the collaboration and moral competence score, in the sender mode for Social Sciences 2<sup>nd</sup> depends on the following causal factors:

$$\text{Hierarchy out-degree } \{0\} * \text{Hierarchy in-degree } \{0\} * \text{MCT- xt } \{1\}$$

This result suggests that there is an association between MCT-xt and the initiative to establish relationships, particularly in the sender effect of collaboration, which is conditioned to a non-hierarchical network for both out-degree and in-degree, as well as a sufficient average of moral competence. Within this specific group, individuals with higher MCT-xt scores tend to initiate collaborative relationships. The exceptional result of the Social Sciences 2<sup>nd</sup> cohort suggests that, at the group level, there is an association between sufficient moral competence and a non-hierarchical network. More broadly, structures with no differentiated status system encourage people to take collaborative initiatives. Regarding the three cohorts with insufficient MCT-xt (Social Sciences 4<sup>th</sup>, History 2<sup>nd</sup>, and History 6<sup>th</sup>), collaboration is more about being attracted to partners with high scores of MCT-xt than being proactive in looking for them. However, we must recognize that this is

a qualitative and provisional result without inferential power.

## 7. Discussion

The average MCT-xt score for the six analysed cohorts ranged from 8.78 to 19.84, indicating that the subjects had “some but very low moral competence” to “sufficient moral competence”. According to Lind, a satisfactory score is 20, which means that students in five of the six cohorts require assistance in recognizing post-conventional options in all or part of the three dilemmas. Bataglia (2010) drew attention to the low scores in the Brazilian context, particularly in the physician’s dilemma involving euthanasia.

When comparing the performance of the different cohorts, several crucial elements need to be considered. For instance, first-year psychology students had an average score of 12.8, while the intermediate group of the same course had an average of 8.78. Assuming that the samples are equivalent, this indicates a significant reduction of 4 points as they progress through college education, which is consistent with Lind’s (2019) criterion. A similar reduction was observed in Social Sciences students, with the 4th cohort having an average score that was approximately 6 points lower than the 2nd cohort. Schillinger (2006) and Bataglia (2001; 2006) have reported similar findings and noted that educational intervention does not always lead to progress in moral competence.

The history cohorts seem to have a different trend to the other cohorts. The first-year students had a higher average of 15.73, and the intermediate group had an even higher average of 18.97. This suggests that there may have been some level of moral competence development or, at the very least, no regression in their moral competence scores. Previous studies have also observed this trend (Feitosa, Rego, Bataglia et al. 2013a; Feitosa, Rego, Bataglia et al. 2013b; Hegazi & Wilson 2013; Martins, Santos, Bataglia, & Duarte 2021).

The combination of moral development theory and sociometric analysis in studying ethical behaviour is still in its exploratory phase, in terms of both theoretical and methodological perspectives. Treviño et al. (2006) reviewed the state of research on ethical behavior in formal organizations, highlighting the limitations of Kohlberg’s cognitive psychology of moral development as an approach to ethical behavior. They emphasized the importance of understanding not only the ability to consistently judge a moral problem but also the motivational force and the context of social interaction in the transition from discernment to action. Factors such as peer influence (Zey-Ferrell & Ferrell 1982), exchange networks in the workplace (Brass, Butterfield, & Skaggs 1998), and seeking approval (Jones & Ryan 1997; 1998) contribute to explaining behaviour in morally relevant situations.

Horstink (2011) researched the organizational environment of the Dutch army to determine how interaction structures based on friendship and collaboration affect the homogeneity of moral reasoning. In order to operationalize this, Horstink used a

psychometric test with a Likert scale to measure adherence to moral values, instead of dilemmas (Hornsveld et al. 2009). Despite the creativity that the research design reveals, the results were compromised since multiple linear regression models were used to isolate the causal effect of the morphological variables of the network (density, centrality) on the attitudinal scores observed in individuals. Linear models are not suitable for structural data that concerns the interdependence of observations (Koskinen & Snijders 2013). Also, Horstink (2011) recognizes that it is impossible to know whether friendship and collaboration relationships are antecedents or consequences of the attitudinal results of the studied groups. In order to overcome this difficulty, a family of exponential models, better known as  $P^*$  or ERGMs, have been developed and used in the present work (Lusher & Robins 2013). In our case, the MCT-xt score is a predictive variable for forming social relationships. Other models allow exploration of whether relationships are predictors of attributes observed in individuals (Autologistic Attribute Actor Model-ALAAM), which in our case would mean asking whether the fact that two people are in a relationship is a predictor of their similarity in the MCT-xt moral cognition score. However, this path implies a different study, which falls outside of our scope.

The main aim of this study was not to explore the differences between dilemmas, but instead to investigate the association of friendship and collaboration relationships with the total score of moral competence. The highest MCT-xt scores were linked to collaboration in four of the six cohorts, while only one had a high moral competence score related to friendship. Comparing these cohorts shows that a satisfactory score of moral competence in homogeneous status systems encourages collaborative initiatives. Our method supports Lind's (2019) thesis in the sense that moral judgment (cognitive dimension) and moral orientation (affective dimension) are aspects, but not components, of moral behavior. They open up two perspectives on the same human capacity without room for dualism. Moral competence is the ability to use principles in a consistent and differentiated way so that practical judgments can be made about what should be done in a specific social situation (Lind 2019; Popoveniuc 2021). Despite the ratio found, MCT-xt – collaboration/MCT-xt – friendship, is 4:1, we cannot forget that the same predictive factor, cognitive competence, is at the base of both social relationship processes. As far as we have observed, emotion and cognition operate through their specific interaction channels, but they could be connected in a way that has yet to be explored.

Our methodological strategy involved utilizing the canonical method for solving dilemmas within specific interaction contexts. By analysing social networks, using the sociogram as a classic instrument, we can interpret the MCT-xt score results based on group dynamics. This approach allows us to observe the reciprocal action of individual cognition and social relationships within the context of an interaction structure. Future research should further explore the main findings of our contextual data, which is the association between a sufficient level of moral cognition (group average) and the status system. The status system can be horizontal, where no actors stand out for their popularity,

or markedly hierarchical, with popularly recognized actors.

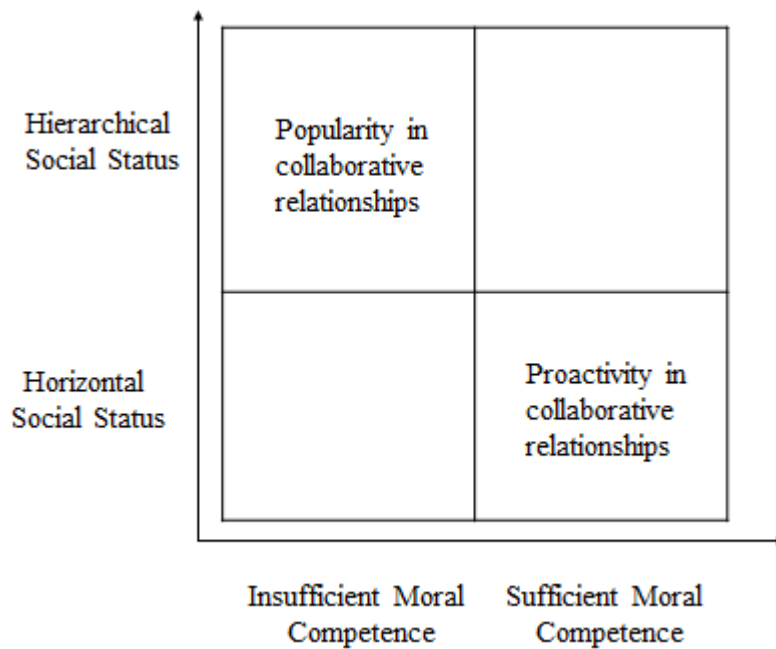


Figure 4: Hypothetical association between moral competence and social status.

For now, and looking at Figure 4, two new hypotheses can be proposed for future work:

*Hypothesis 1:* In groups characterized by a horizontal status system and a sufficient level of moral competence, individuals will proactively undertake their collaborative tasks.

*Hypothesis 2:* In groups characterized by a hierarchical status system and an insufficient level of moral competence, the most popular individuals attract collaborative tasks.

Both hypotheses stress what Piaget (1994) had already discussed regarding the role of cooperation in developing autonomy. From this, it is worth considering at least two emerging questions for new research: Firstly, if longitudinal data were available, could we prove that collaborative exchanges between students with high moral competence scores are sustained over time while the recognized status system remains horizontal? We assume that friendship differs from cooperation because one is more linked to emotion, and the other to cognition, thus reflecting the dual aspect of moral competence. Secondly, would moral autonomy be encouraged by cooperation and friendship relationships? However, studies suggest that forms of collaboration, e.g., levels of altruism, as pointed

out by Curry & Dunbar (2011), will depend not only on the properties of individuals and dyads but also on the properties of the larger social network in which they are embedded. There is a broad horizon and multiple roads to travel in order to find the association between moral competence and social contexts.

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