Collective Trust and Normative Agents

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Collective trust: Why?

Three informal examples.

The starting point: Individual trust.


Collective trust. Step 1: Joint trust.

Collective trust. Step 2: Reliance.


Collective trust. Step 4: Deontic conditions, effects, and trust deception.


Collective trust. Step 1: Joint trust.


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Collective trust. Step 4: Deontic conditions, effects, and trust deception.
Collective trust: Three examples (1)

Example 1
Suppose that agent $y$ is at the bus stop, and there is a group $G$ of people standing not at the bus stop but close to $y$, expecting that $y$ will raise her hand and stop the bus.

Example 2
It is Mary's birthday. Her co-workers give some money to $y$, another co-worker who is going downtown, delegating to $y$ the search and purchase of a gift. Everyone trusts that $y$ will do so.
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Example 3

Every December, student bands build up street-puppets filled with fireworks, which are to be burned on New Year's day. Each band builds its chosen puppet-of-the-year from scratch. The town administration institutionalized a competition and settled an award for the best figure. Bands' custom establishes that figures ought to be watched and protected day and night, this because a very common practice is to burn other bands' figures before the New Year's day by sending one band member (a saboteur). The consequence of successful sabotages is the exclusion of opponents from the competition. Assume that \( s \), band G's saboteur, is deliberately sent by G to burn band H's figure.
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Agent $x$ trusts agent $y$ with respect to $A$ whenever
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\[
\text{Trust} \; x \; y \; A \equiv \text{Goal} \; x \; A \land \text{Bel} \; x \; \text{Does} \; y \; A \land \text{Int} \; x \; (\text{Does} \; y \; A \land \neg \text{Does} \; x \; A) \land \text{Goal} \; x \land \text{Int} \; y \; A \land \text{Bel} \; x \; \text{Int} \; y \; A
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Agent $x$ trusts agent $y$ with respect to $A$ whenever

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- $x$ has goal $A$,
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Trust $x$ $y$ $A$ $\equiv$ Goal $x$ $A$ $\land$ Bel $x$ Does $y$ $A$ $\land$ Int $x$ (Does $y$ $A$ $\land$ $\neg$ Does $x$ $A$) $\land$ Goal $x$ Int $y$ $A$ $\land$ Bel $x$ Int $y$ $A$. 

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$$\text{Trust}_{x}^{y}A \equiv \text{Goal}_x A \land \text{Bel}_x \text{Does}_y A \land \text{Int}_x (\text{Does}_y A \land \neg \text{Does}_x A) \land \text{Goal}_x \text{Int}_y A \land \text{Bel}_x \text{Int}_y A$$
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Joint trust

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$$\text{JTrust}_y^G A \equiv (\bigwedge_{i \in G} \text{Trust}_y^i A)$$
In the birthday-gift example (Example 2) there is a “common front”:

\[
\text{Rel} \equiv \text{JTrust} \land \text{MInt}_G(A \land \text{MInt}_G(A))
\]

For full axiomatization and semantics see Dunin-Keplicz & Verbrugge 2002.
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Generalizations: Trust between groups

Joint trust:
Suppose that group $H$ is at the bus stop, and there is a group $G$ of people standing not at the bus stop but close to $H$, expecting that $G$ will stop the bus.

$J_{\text{Trust}}_{G,H,A} \equiv \bigwedge_{j \in H} J_{\text{Trust}}_{G,A}^j$

Reliance:
$R_{\text{el}}_{G,H,A} \equiv J_{\text{Trust}}_{G,H,A} \land M_{\text{Int}}_{G} (J_{\text{Trust}}_{G,H,A})$

Collective trust:
$C_{\text{Trust}}_{G,H,A} \equiv R_{\text{el}}_{G,H,A} \land \text{CBel}_{G}(R_{\text{el}}_{G,H,A})$
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  \[ C_{\text{Trust}}^G_{H}A \equiv R_{\text{el}}^G_{H}A \land C_{\text{Bel}}^G (R_{\text{el}}^G_{H}A) \]
Deontic: *In solidum* legal obligations

In solidum legal obligations raise a "common front" of agents: for example, each member of the front can behave, in principle, as creditor or debtor of the whole. What happens to one agent is propagated, in principle, to the others: what an agent does as a member of the front is imputed to the other members, as long as they act in representation of a communal interest.

Example:
A group $C$ of creditors and a group $D$ of debtors, agreed that $D$ will reimburse by a certain date an amount of money $C$ lend to $D$. In "solid" obligations it is often the case that the payment made by one member $d$ of the co-debtors sets the others free:

$\text{Does } d \text{ reimbursement } \rightarrow \text{CTrust}$

$D$ released $C$. Smith and A. Rotolo
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  $$\text{Does}_d \text{reimbursement} \rightarrow \text{CTrust}_d^D \text{released}$$
Deontic significance: other examples

Example:
Agent $i$, member of Firm $F$, an organization of accountants, is entrusted by $F$ to enter into negotiations with the owner $j$ of an office block, Group $G$, with the view of renting space for their new office. Before signing the contract, Firm $F$ finds an equivalent offer but at a lesser rent. Group $G$ is induced by $i$ of Firm $F$ to believe in the future conclusion of a contract. On account of this, if Firm $F$, abandons negotiations without justification, it violates standards of contractual correctness and it is under the obligation to restore the damage suffered by $G$.

Let $i \in F$:

$$(\text{CTrust} \ G \ F \ A) \land \neg \text{Does} \ i \ A \rightarrow \text{Obl} \ G (\text{Does} \ i \ \text{compensate})$$

Or

$$(\text{CTrust} \ G \ F \ A) \land \neg \text{Does} \ i \ A \rightarrow \text{Obl} \ G (\lor \ k \in F \text{Does} \ k \ \text{compensate})$$

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Future work

The logical system (Dunin-Keplicz & Verbrugge 2002) on which our analysis is based

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We proposed a logical methodology based on DL for modelling individual trust and good faith that avoids these difficulties (Rotolo, Sartor & Smith, forthcoming): How to extend this system to cover collective trust is a matter of future research.
Thank you!