Classification of Children's Social Dominance in Group Interactions with Robots

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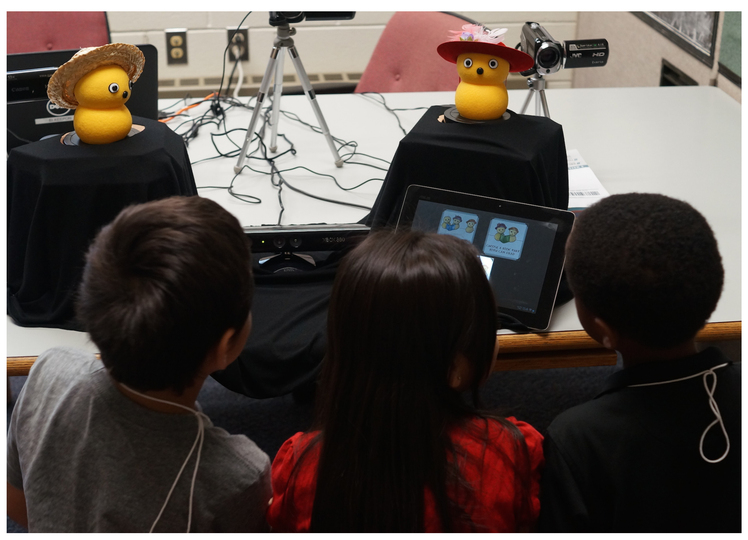
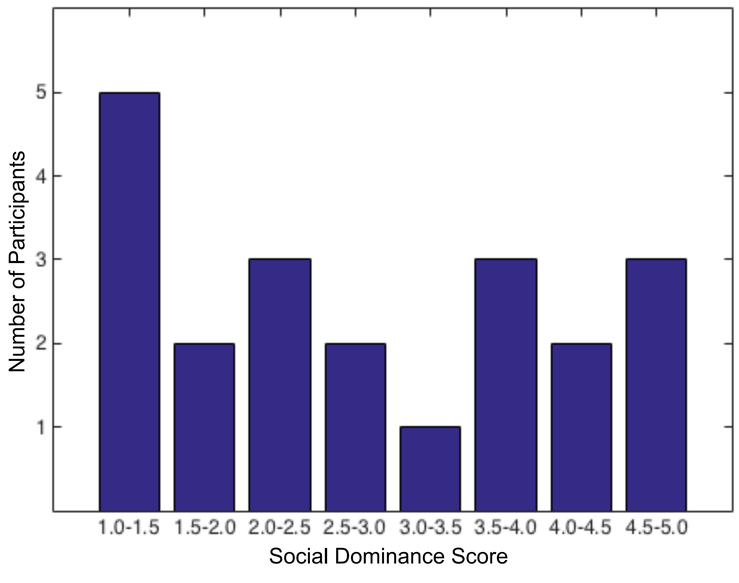
Social dominance is a highly influential factor in social interactions, expressed through both verbal and nonverbal behaviors. As social robots become more widespread in educational environments, their ability to **understand group dynamics** and engage multiple children in social interactions is essential.

Data Collection



We collected a corpus of video and audio data of groups of three children (ages 6 to 8) interacting with robots performing an interactive dialogue.

Distribution of Social Dominance Scores

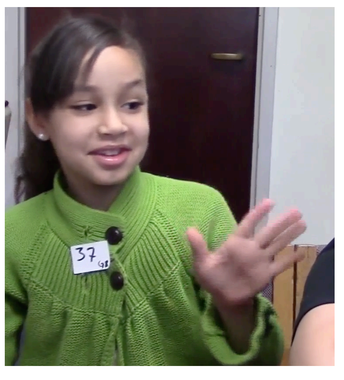


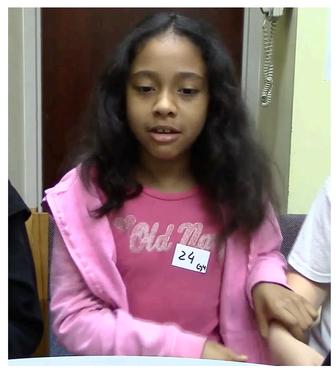
Each participant was given a social dominance score based on teacher evaluations of the participant. The distribution of scores is shown in the figure on the right.

Social Dominance Behavioral Features

We investigated the following verbal and nonverbal behaviors in relation to teacher-rated social dominance levels for each child:

Verbal/ Nonverbal	Behavior	Sub-category behaviors
Verbal	Total talking time	
Verbal	Interruptions	Successful, unsuccessful
Verbal	Utterance addressee	Colleagues, robots, no one
Verbal	Utterance type	Demand, suggestion, helping, thinking aloud, insult, other
Nonverbal	Gestures	Illustrative, intrusive, adaptor
Nonverbal	Physical coercion	
Nonverbal	Gaze	Colleagues, robots, no one





Examples of some nonverbal behaviors we examined: illustrative gestures (left) and physical coercion (right).

Results

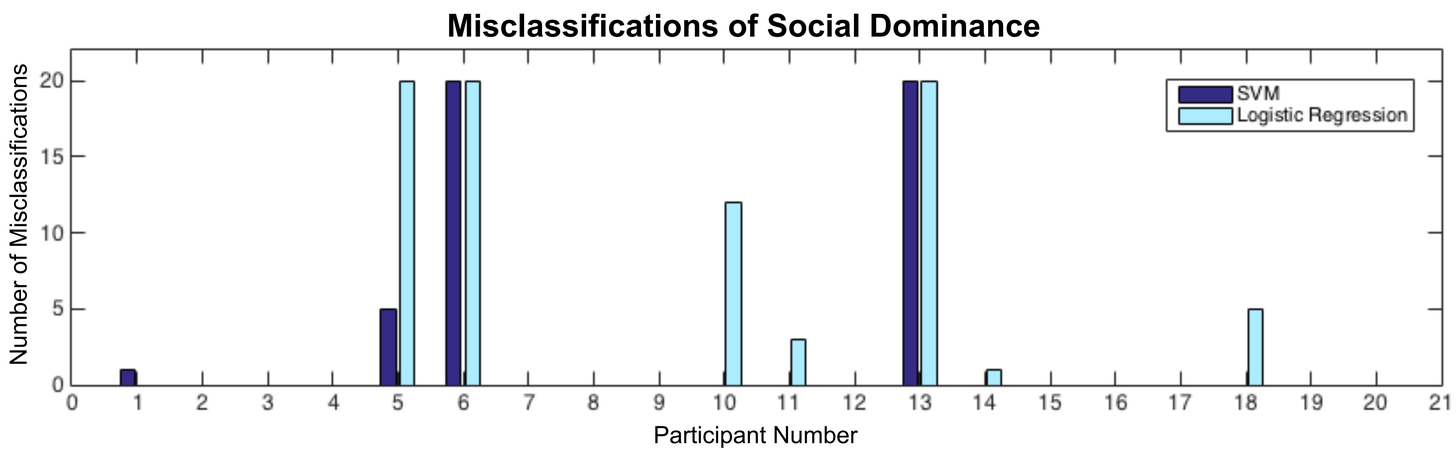
Correlation Analysis

We selected the 4 behavioral features with the highest Pearson correlation (ρ) absolute value for training our models. These features are listed in the table below.

Behavior Feature	Abs(ρ)
(Being) Looked At	0.587
Looking at Robot 1	0.449
Physical Coercion	0.388
Illustrative Gestures	0.369

Classification Models

Model	Accuracy	F1 Score
Support Vector Machines	0.890	0.871
Logistic Regression	0.807	0.764



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