Salient Gender Identity and Power Imbalance in a Group Contest

Usame Berk Aktas[1]  Florian Heine[2] 

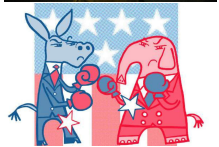
[1]Tilburg University

[2]Vrije Universiteit Amsterdam

March 2023

Introduction – Group Contests

- Applications for group contests range from warfare, to research and from political campaigns, to rent-seeking activities.
  - Examples: racial conflict, conflict relating to language, religion or culture, political competition, collective rent-seeking...
- Group identity as one of the major components in initiating and escalating conflict.
  - We study the effect of the salience of types of identities and its interaction with group size on group conflict.



Introduction – Social Identity

Identity is one of the main ingredients of the cause of conflict

Sen (2007) Theory The salience of real identities can cause conflict.

Chowdhury et al. (2016) Experiment Two homogeneous groups – East Asians and Caucasians – compete in a contest either without revealing the racial composition or with revealing it.

- Revealing racial composition increases effort.
- Using UK nationals and immigrants, Bhaumik et al. (2020) find no effect in a similar setup.

Gender as Identity

- Sen (2007) defines gender as one of the groups through which we define ourselves in daily life.
- Categorisation in terms of gender avoid problem of identification. Observations of membership by gender are usually made without any error (Akerlof and Kranton, 2002).

Introduction – Social Identity

Identity is one of the main ingredients of the cause of conflict

Sen (2007) Theory The salience of real identities can cause conflict.

Chowdhury et al. (2016) Experiment Two homogeneous groups – East Asians and Caucasians – compete in a contest either without revealing the racial composition or with revealing it.

- Revealing racial composition increases effort.
- Using UK nationals and immigrants, Bhaumik et al. (2020) find no effect in a similar setup.

Gender as Identity

- Sen (2007) defines gender as one of the groups through which we define ourselves in daily life.
- Categorisation in terms of gender avoid problem of identification. Observations of membership by gender are usually made without any error (Akerlof and Kranton, 2002).

Introduction – Gender Identity in Contests

Competitive Environments

(Group) Contest Games Female participants contribute more to the contest (Price and Sheremeta, 2015; Chowdhury et al., 2016; Heine and Sefton, 2018)...

- In Chowdhury et al. (2016), higher efforts in the social identity manipulation are predominantly driven by female participants.
- Females are more prone to the winner's curse (Casari et al., 2007).
- Identity brings in more competitiveness among females in a laboratory setting (Cadsby et al., 2013).

Other Situations Males are more aggressive and competitive in situations in which the conflict is physical and can sustain physical harm. In non-physical conflict situations females are either more aggressive than their male counterparts or there is no significant gender difference (Hyde, 2005).

- Some exceptions: Lower degree of competitiveness in female participants (Gneezy et al., 2003)

- Phenomenon of female competitiveness in between group competition triggered via group identity?
- Group contests ubiquitous within firms, especially among top management.

Introduction – Gender Identity in Contests

Competitive Environments

(Group) Contest Games Female participants contribute more to the contest (Price and Sheremeta, 2015; Chowdhury et al., 2016; Heine and Sefton, 2018)...

- In Chowdhury et al. (2016), higher efforts in the social identity manipulation are predominantly driven by female participants.
- Females are more prone to the winner's curse (Casari et al., 2007).
- Identity brings in more competitiveness among females in a laboratory setting (Cadsby et al., 2013).

Other Situations Males are more aggressive and competitive in situations in which the conflict is physical and can sustain physical harm. In non-physical conflict situations females are either more aggressive than their male counterparts or there is no significant gender difference (Hyde, 2005).

- Some exceptions: Lower degree of competitiveness in female participants (Gneezy et al., 2003)

- Phenomenon of female competitiveness in between group competition triggered via group identity?
- Group contests ubiquitous within firms, especially among top management.

Introduction – Gender Identity in Contests

Competitive Environments

(Group) Contest Games Female participants contribute more to the contest (Price and Sheremeta, 2015; Chowdhury et al., 2016; Heine and Sefton, 2018)...

- In Chowdhury et al. (2016), higher efforts in the social identity manipulation are predominantly driven by female participants.
- Females are more prone to the winner's curse (Casari et al., 2007).
- Identity brings in more competitiveness among females in a laboratory setting (Cadsby et al., 2013).

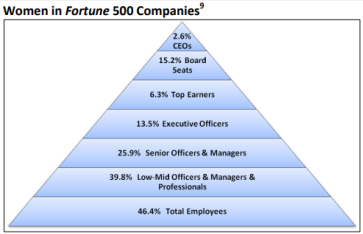
Other Situations Males are more aggressive and competitive in situations in which the conflict is physical and can sustain physical harm. In non-physical conflict situations females are either more aggressive than their male counterparts or there is no significant gender difference (Hyde, 2005).

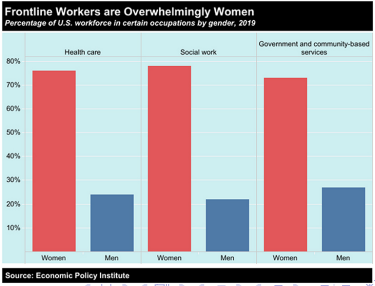
- Some exceptions: Lower degree of competitiveness in female participants (Gneezy et al., 2003)

- Phenomenon of female competitiveness in between group competition triggered via group identity?
- Group contests ubiquitous within firms, especially among top management.

Introduction – (Power) Imbalance

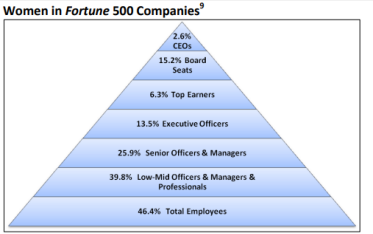
- Many related applications in the field, such as competition for promotion or tenure, are characterised by a (power) imbalance between social identity groups.
  - How does the salience of social identity (gender identity) influence the degree of engagement into competition between groups?
  - Interaction with being (dis-)advantaged.

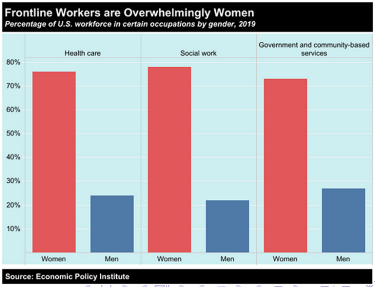




Introduction – (Power) Imbalance

- Many related applications in the field, such as competition for promotion or tenure, are characterised by a (power) imbalance between social identity groups.
- → How does the salience of social identity (gender identity) influence the degree of engagement into competition between groups?
- → Interaction with being (dis-)advantaged.





Research Questions

- We contribute to the field of *conflict and identity* by investigating
  - Whether *(salience of) gender composition* alters conflict seeking behaviour in an experimentally controlled environment.
- We investigate, for the first time, the *interaction* of identity and group size.

Our game: Larger groups have more resources.

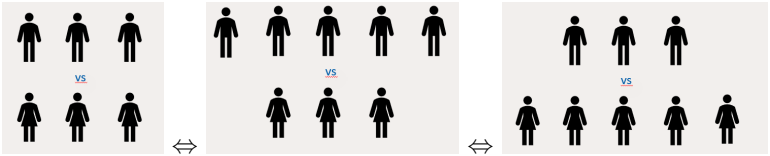
- How does this interact with salience of social identity?
- Effect on contest investment when in disadvantaged position?

Research Questions

- We contribute to the field of *conflict and identity* by investigating
  - Whether *(salience of) gender composition* alters conflict seeking behaviour in an experimentally controlled environment.
- We investigate, for the first time, the *interaction* of identity and group size.

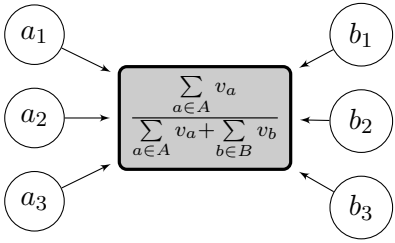
Our game: Larger groups have more resources.

- How does this interact with salience of social identity?
- Effect on contest investment when in disadvantaged position?



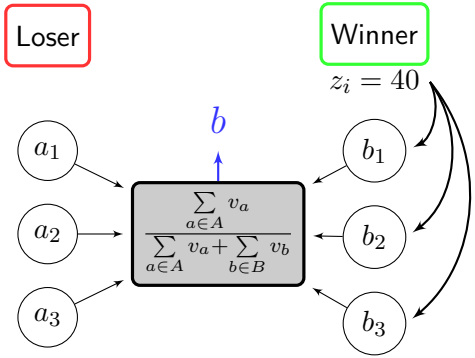
Contest Game – Symmetric Control

- Groups of three (partner matching) compete for a prize.
- Individual per-period endowment of $T_i = 60$ points.
- Individual prize if winning: $z_i = 40$ points.



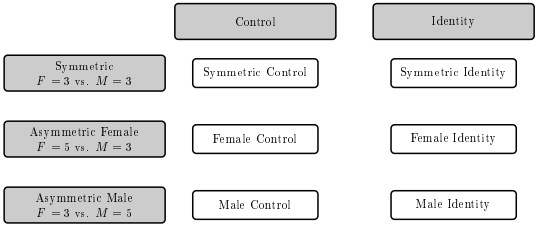
Contest Game – Symmetric Control

- Groups of three (partner matching) compete for a prize.
- Individual per-period endowment of $T_i = 60$ points.
- Individual prize if winning: $z_i = 40$ points.



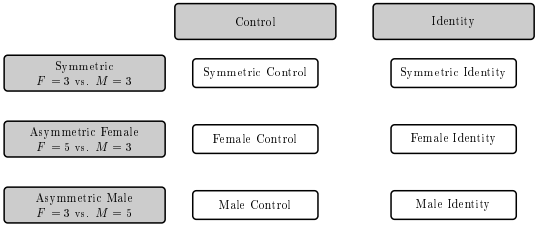
Experimental Design

- Group contest game (Tullock, 1980; Katz et al., 1990), a game typically used in experimental literature to study conflict behaviour (Dechenaux et al., 2015).
  - Players can expend costly resources in order to increase their chance to win a prize (which results in their opponent not winning the prize).
- Repeated play in partner matching (as in Chowdhury et al., 2016).
- 3×2 design to investigate how (salience of) identity and asymmetry affect conflict levels ((A)symmetry as in Kugler et al., 2010).



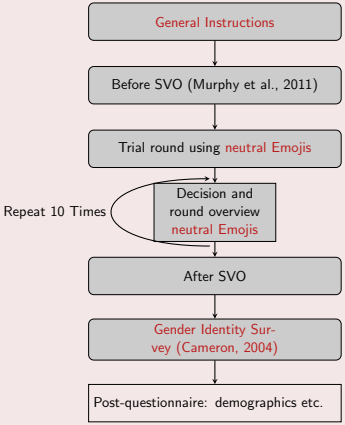
Experimental Design

- Group contest game (Tullock, 1980; Katz et al., 1990), a game typically used in experimental literature to study conflict behaviour (Dechenaux et al., 2015).
  - Players can expend costly resources in order to increase their chance to win a prize (which results in their opponent not winning the prize).
- Repeated play in partner matching (as in Chowdhury et al., 2016).
- 3×2 design to investigate how (salience of) identity and asymmetry affect conflict levels ((A)symmetry as in Kugler et al., 2010).

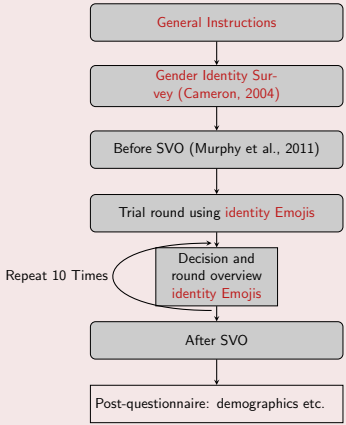


Experimental Setup

Control Treatments



Identity Treatments



Gender Identity Survey

- We use a social identity questionnaire by (Cameron, 2004)
  - Identity represented on three factors: centrality; ingroup affect; and ingroup ties
  - Its efficacy examined in five studies involving 1,078 respondents, one nonstudent sample, and three group memberships (university, *gender*, and nationality)
- 12 item Likert type questionnaire
  - I have a lot in common with other *(ingroup members)*.
  - I feel strong ties to other *(ingroup members)*.
  - I find it difficult to form a bond with other *(ingroup members)*.
  - ...

Making Identity Salient in the Contest Game

- We use emojis that either reflect the gender identity group, or neutral ones.
  - Emojis developed by OpenMoji (2020). OpenMoji graphics are licensed under the Creative Commons Share Alike License 4.0 (CC BY-SA 4.0).

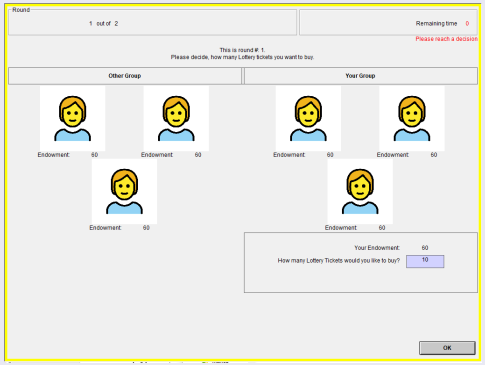
Emojis

(a) Male Emoji **(b)** Female Emoji **(c)** Gender-neutral Emoji

Figure: Emojis to make gender social identity salient.

Making Identity Salient in the Contest Game

Control Treatment



Identity Treatment

Theory and Hypotheses

$$\max_{a_g} \pi_g \left(\sum_{i \in A} i_a, \sum_{j \in B} b_j \right) = e + \frac{\sum_{a \in A} a_i}{\sum_{a \in A} a_i + \sum_{b \in B} b_j} \cdot z_i - a_g \tag{1}$$

- Konrad (2009) (and a myriad of other papers) show that for a group A, there exists a multiplicity of equilibria under individualistic preferences characterised by:

$$\sum_{i \in A} a_i = \frac{z_i}{4} \tag{2}$$

- At group level:

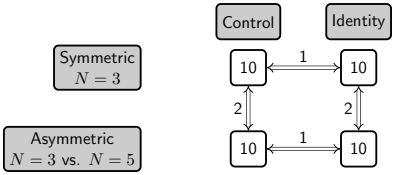
Theory and Hypotheses

$$\max_{a_g} \pi_g \left(\sum_{i \in A} i_a, \sum_{j \in B} b_j \right) = e + \frac{\sum_{a \in A} a_i}{\sum_{a \in A} a_i + \sum_{b \in B} b_j} \cdot z_i - a_g \tag{1}$$

- Konrad (2009) (and a myriad of other papers) show that for a group A, there exists a multiplicity of equilibria under individualistic preferences characterised by:

$$\sum_{i \in A} a_i = \frac{z_i}{4} \tag{2}$$

- At group level:



Theory and Hypotheses

- We use a social preferences model similar to Chen and Li (2009); Zaunbrecher and Riedl (2016); Kolmar and Wagener (2019)
- Agents maximise weighted sum of own and others' payoffs:

$$u_g(i) = (1-\alpha) \cdot \pi_g + \alpha \cdot \overline{\pi}_{A \setminus g} \tag{3}$$

  - π_g is g's payoff as in Equation 1, a_g is g's individual investment into the contest, $\overline{\pi}_{A \setminus g}$ is the average payoff of player g's other group members.
  - α is the social-identity parameter, i.e. the weight g puts on group mates' payoff. Parameter α reflects the strength of g's social identity, where a higher α implies a stronger social identity.

$$\begin{aligned} u_g\left(\sum_{i\in A} a_i, \sum_{j\in B} b_j\right) =& (1-\alpha)\left[T_i + \frac{\sum_{i\in A} a_i}{\sum_{i\in A} a_i + \sum_{j\in B} b_j} \cdot z_i - a_g\right] + \\ & \frac{\alpha}{N_A - 1}\left[(N_A - 1)\left(T_i + \frac{\sum_{i\in A} a_i}{\sum_{i\in A} a_i + \sum_{j\in B} b_j} \cdot z_i\right) - \sum_{i\in A\setminus g} a_i\right] \end{aligned} \tag{4}$$

Theory and Hypotheses

Symmetrical Groups

- We can show that:

$$\sum_{i \in A} a_i = \frac{z_i (1-\beta)}{(2-\alpha-\beta)^2}. \tag{5}$$

and

$$\sum_{j \in B} b_j = \frac{z_i (1-\alpha)}{(2-\alpha-\beta)^2} \tag{6}$$

- Further, $\frac{\partial \sum_{i \in A} a_i}{\partial \alpha} \geq 0$
- Does the social identity parameter α change in the identity treatment?
- We expect salience to enhance identity, i.e. increasing α.

Hypothesis 1

Total investment will be greater in the Social Identity Treatment.

Theory and Hypotheses

Symmetrical Groups

- We can show that:

$$\sum_{i \in A} a_i = \frac{z_i (1-\beta)}{(2-\alpha-\beta)^2}. \tag{5}$$

and

$$\sum_{j \in B} b_j = \frac{z_i (1-\alpha)}{(2-\alpha-\beta)^2} \tag{6}$$

- Further, $\frac{\partial \sum_{i \in A} a_i}{\partial \alpha} \geq 0$
- Does the social identity parameter α change in the identity treatment?
- We expect salience to enhance identity, i.e. increasing α.

Hypothesis 1

Total investment will be greater in the Social Identity Treatment.

Theory and Hypotheses

Power imbalance between competing groups through relative over-representation of one group.

- Prior empirical results suggest that larger groups have a higher probability of winning against smaller groups (Sheremeta, 2018; Ahn et al., 2011; Abbink et al., 2010).
- If we attempt to explain this empirical finding with our model, we have:

$$N_A > N_B \rightarrow \sum_{a \in A} i_a > \sum_{b \in B} i_b \tag{7}$$

- Plugging Equations 5 and 6 delivers

$$\frac{z_i(1-\beta)}{(2-\alpha-\beta)^2} > \frac{z_i(1-\alpha)}{(2-\alpha-\beta)^2},$$

which simplifies into

$$\alpha > \beta.$$

- Social-identity parameter stronger in the large group.

Hypothesis 2

Total investment into the contest will be higher in the large group than in the small group.

Theory and Hypotheses

Power imbalance between competing groups through relative over-representation of one group.

- Prior empirical results suggest that larger groups have a higher probability of winning against smaller groups (Sheremeta, 2018; Ahn et al., 2011; Abbink et al., 2010).
- If we attempt to explain this empirical finding with our model, we have:

$$N_A > N_B \rightarrow \sum_{a \in A} i_a > \sum_{b \in B} i_b \tag{7}$$

- Plugging Equations 5 and 6 delivers

$$\frac{z_i(1-\beta)}{(2-\alpha-\beta)^2} > \frac{z_i(1-\alpha)}{(2-\alpha-\beta)^2},$$

which simplifies into

$$\alpha > \beta.$$

- Social-identity parameter stronger in the large group.

Hypothesis 2

Total investment into the contest will be higher in the large group than in the small group.

Theory and Hypotheses

Power imbalance between competing groups through relative over-representation of one group.

- Prior empirical results suggest that larger groups have a higher probability of winning against smaller groups (Sheremeta, 2018; Ahn et al., 2011; Abbink et al., 2010).
- If we attempt to explain this empirical finding with our model, we have:

$$N_A > N_B \rightarrow \sum_{a \in A} i_a > \sum_{b \in B} i_b \tag{7}$$

- Plugging Equations 5 and 6 delivers

$$\frac{z_i (1-\beta)}{(2-\alpha-\beta)^2} > \frac{z_i (1-\alpha)}{(2-\alpha-\beta)^2},$$

which simplifies into

$$\alpha > \beta.$$

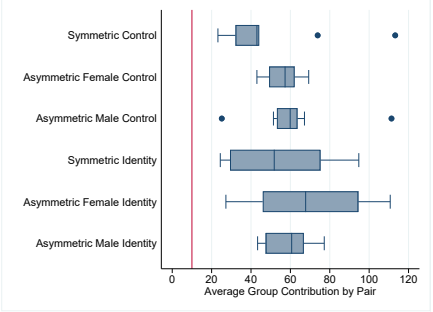
- Social-identity parameter stronger in the large group.

Hypothesis 2

Total investment into the contest will be higher in the large group than in the small group.

Results – Overview

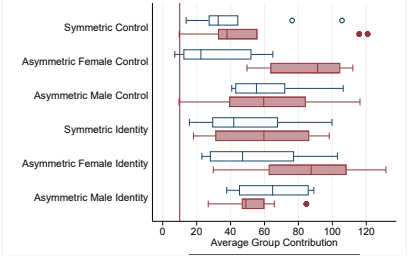
	Average	Standard Deviation	N
Symmetric Control	48.811	28.227	9
Asymmetric Female Control	56.693	8.727	7
Asymmetric Male Control	61.219	23.876	8
Symmetric Identity	54.000	26.283	8
Asymmetric Female Identity	69.287	30.383	8
Asymmetric Male Identity	58.806	11.890	8
Total	57.972	23.117	48



- Group contribution in all treatments significantly exceeds equilibrium prediction.
- Contribution in Identity Treatments does not appear higher.
- Social Identity does increase noise in data.

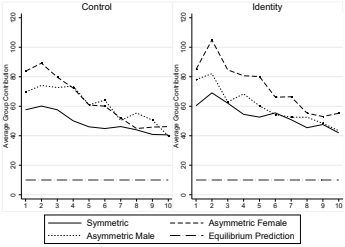
Results – Overview

	Average	Standard Deviation	N
Symmetric Control Male	47.863	28.473	8
Symmetric Control Female	56.163	40.560	8
Asymmetric Female Control Male	29.486	21.979	7
Asymmetric Female Control Female	83.900	23.104	7
Asymmetric Male Control Male	60.938	22.555	8
Asymmetric Male Control Female	61.500	33.521	8
Symmetric Identity Male	49.188	28.948	8
Symmetric Identity Female	58.812	30.827	8
Asymmetric Female Identity Male	56.400	31.960	7
Asymmetric Female Identity Female	86.786	34.901	7
Asymmetric Male Identity Male	64.812	22.271	8
Asymmetric Male Identity Female	52.800	16.791	8
Total	58.833	30.471	92



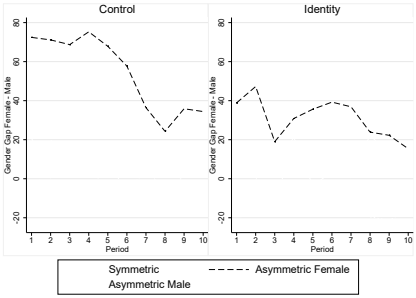
- Female participants contribute more to the contest when in a larger group.
  - This is true whether or not the gender identity is salient.
- When male participants are in a larger group, they do not outbid their female competitors.

Results – Overview



- For all treatments, overall effort decreases over time.
  - Some display an initial increase in effort.

Difference between contest investment in female and male groups

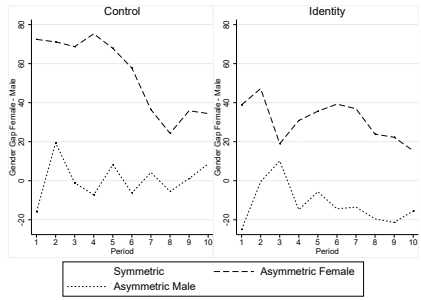


- Female groups invest relatively more into the contest when in an advantaged position.
  - I.e., when in larger group, Asymmetric Female treatments
  - Effect more pronounced if gender identity is *not* salient (Wilcoxon test, $N = 30,\ z = -3.215,\ p = 0.0013$).

Asymmetric Male Negative gender gap when identity is salient, but gap absent without salience? (Wilcoxon test, $N = 32,\ z = 0.603,\ p = 0.5641$).

Symmetric Small yet not statistically significant difference between female and male group investment (Wilcoxon test, $N = 34,\ z = -0.827,\ p = 0.4084$).

Difference between contest investment in female and male groups

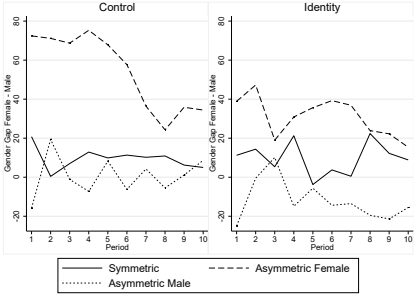


- Female groups invest relatively more into the contest when in an advantaged position.
  - I.e., when in larger group, Asymmetric Female treatments
  - Effect more pronounced if gender identity is *not* salient (Wilcoxon test, $N = 30,\ z = -3.215,\ p = 0.0013$).

Asymmetric Male Negative gender gap when identity is salient, but gap absent without salience? (Wilcoxon test, $N = 32,\ z = 0.603,\ p = 0.5641$).

Symmetric Small yet not statistically significant difference between female and male group investment (Wilcoxon test, $N = 34,\ z = -0.827,\ p = 0.4084$).

Difference between contest investment in female and male groups

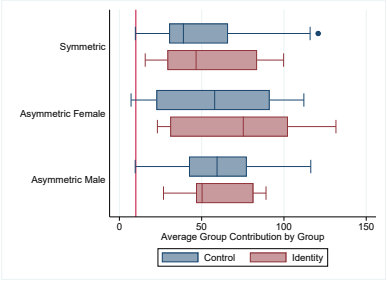


- Female groups invest relatively more into the contest when in an advantaged position.
  - I.e., when in larger group, Asymmetric Female treatments
  - Effect more pronounced if gender identity is *not* salient (Wilcoxon test, $N = 30,\ z = -3.215,\ p = 0.0013$).

Asymmetric Male Negative gender gap when identity is salient, but gap absent without salience? (Wilcoxon test, $N = 32,\ z = 0.603,\ p = 0.5641$).

Symmetric Small yet not statistically significant difference between female and male group investment (Wilcoxon test, $N = 34,\ z = -0.827,\ p = 0.4084$).

Hypothesis 1 – Total Investment Greater in the Social Identity Treatment

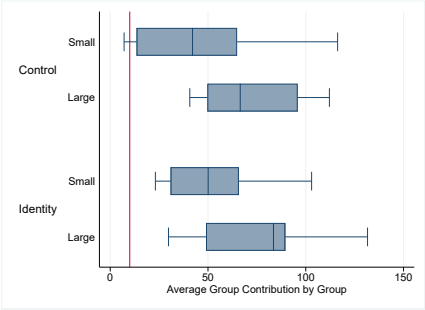


- No significant difference between Control and Identity treatments.
- Making Gender Identity salient does not induce higher contest engagement.

	(1)	(2)
	Group Contribution in t	
Asymmetric Female	−0.394	
Control	(2.88)	
Asymmetric Male	1.100	
Control	(3.23)	
Symmetric Identity	0.732	
	(3.02)	
Asymmetric Female	2.292	
Identity	(3.57)	
Asymmetric Male	−0.085	
Identity	(2.85)	
Female	3.270**	4.462*
	(1.64)	(2.50)
Identity		1.851
		(1.96)
Female ×		−2.300
Identity		(2.90)
Lagged Group	0.787***	0.788***
Contribution	(0.02)	(0.02)
Lagged Other Group	0.054*	0.058**
Contribution	(0.03)	(0.03)
Period	−0.893***	−0.875***
	(0.26)	(0.26)
Constant	9.729***	8.999***
	(2.63)	(2.47)
Number of observations	864	864
Number of panels	96	96
Within model R-squared	0.265	0.265
Between model R-squared	0.978	0.978
Overall R-squared	0.693	0.693

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Clustered standard errors in parentheses

Hypothesis 2 – Total Investment Higher in the Large Group

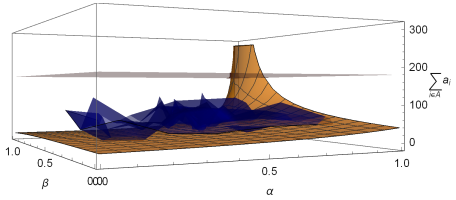


- Some evidence that large groups invest more.
  - Salience of social identity crowds out investment in female groups.

	(1)	(2)	(3)	(4)
	Group Contribution in t			
Large	5.132**	4.499*	5.211	7.584*
	(2.08)	(2.58)	(3.50)	(4.14)
Female	5.159**	4.526	5.164**	10.198*
	(2.24)	(3.14)	(2.28)	(5.24)
Identity	0.908	0.890	0.981	6.441
	(2.03)	(2.01)	(3.08)	(4.01)
Large × Female		1.266		−3.510
		(4.00)		(5.11)
Large × Identity			−0.147	−5.089
			(3.97)	(4.96)
Identity × Female				−10.443*
				(5.80)
Large × Identity × Female				9.311
				(7.51)
Lagged Group Contribution	0.743***	0.743***	0.743***	0.732***
	(0.04)	(0.04)	(0.04)	(0.03)
Lagged Other Group Contribution	0.055*	0.054*	0.055*	0.059*
	(0.03)	(0.03)	(0.03)	(0.03)
Round	−1.256***	−1.259***	−1.256***	−1.290***
	(0.36)	(0.37)	(0.37)	(0.37)
Constant	11.426***	11.825***	11.384**	9.171*
	(3.96)	(3.97)	(4.51)	(4.97)
Number of observations	558	558	558	558
Number of panels	62	62	62	62
Within model R-squared	0.327	0.327	0.327	0.329
Between model R-squared	0.966	0.966	0.966	0.963
Overall R-squared	0.686	0.686	0.686	0.689

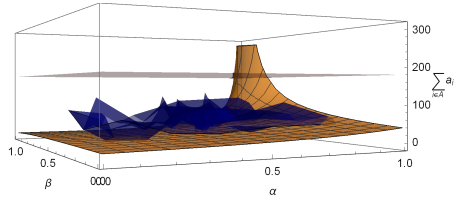
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Clustered standard errors in parentheses.

Social Preferences



- Using ingroup bias of own group (α) and other group (β), we represent group contribution by a surface in the $\sum_{i \in A} a_i \times \alpha \times \beta$-space
- Group investment significicantly higher than prediction (Wilcoxon test, $N = 96,\ z = 7.908,\ p < 0.0001$).
- Significant positive effect for social-identity parameter α.

Social Preferences



- Using ingroup bias of own group (α) and other group (β), we represent group contribution by a surface in the $\sum_{i \in A} a_i \times \alpha \times \beta$-space
- Group investment significicantly higher than prediction (Wilcoxon test, $N = 96,\ z = 7.908,\ p < 0.0001$).
- Significant positive effect for social-identity parameter α.

	(1)	(2)	(3)
	Group Contribution in t		
Alpha	8.413**	10.195*	7.354*
	(3.29)	(5.38)	(3.95)
Identity × Alpha		−2.968	
		(6.82)	
Female × Alpha			4.228
			(9.99)
Identity	−0.966	0.355	−1.040
	(1.66)	(3.28)	(1.64)
Beta	5.328	5.353	5.311
	(4.42)	(4.50)	(4.45)
Female	3.135*	3.095*	1.184
	(1.68)	(1.71)	(5.53)
Lagged Group Contribution	0.787***	0.786***	0.786***
	(0.02)	(0.02)	(0.02)
Lagged Other Group Contribution	0.055*	0.055*	0.057**
	(0.03)	(0.03)	(0.03)
Round	−0.887***	−0.891***	−0.886***
	(0.26)	(0.26)	(0.26)
Constant	4.502	3.877	4.963
	(3.25)	(3.25)	(3.63)
Number of observations	864	864	864
Number of panels	96	96	96
Within model R-squared	0.265	0.265	0.265
Between model R-squared	0.980	0.979	0.980
Overall R-squared	0.695	0.695	0.695

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Clustered standard errors in parentheses.

Conclusion

- Often, gender difference in promotion attributed to tendency to shy away from competition on the part of females (Lawless and Fox, 2008; Davies-Netzley, 1998).
- Here: Controlled study investigating degree of engagement in between-group contest against opposite gender identity players.
  - Vary salience of gender identity to test if this affects behaviour and interacts with own gender identity.

Our Results Show

- Being in a position of power can drive competitiveness.
  - Larger, more powerful groups invest more into the contest.
- Male and female groups react very differently to the salience

Conclusion

- Often, gender difference in promotion attributed to tendency to shy away from competition on the part of females (Lawless and Fox, 2008; Davies-Netzley, 1998).
- Here: Controlled study investigating degree of engagement in between-group contest against opposite gender identity players.
  - Vary salience of gender identity to test if this affects behaviour and interacts with own gender identity.

Our Results Show

- Being in a position of power can drive competitiveness.
  - Larger, more powerful groups invest more into the contest.
- Male and female groups react very differently to the salience

Conclusion

Male and female groups react very differently to the salience of gender identity.

Female-dominated contest Salient gender identity *decreases* gender gap.

Male-dominated contest Salient gender identity *increases* gender gap.

- Result not driven via social identity or in-group cohesion.
  - Both social-identity parameter α and Pre-Game and Post-Game SVO do not differ by gender identity.

Power Analysis

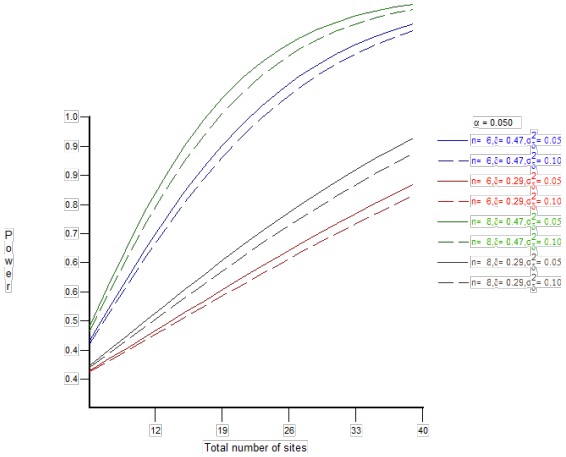
- We base the power analysis on the results of Chowdhury et al. (2016), in specific between the treatments *Baseline* and *Race*.

Table 5
Mean (St. Dev.) Individual efforts per period separated by gender.

		Baseline	Color	Race
Male	Mean	11.523	11.313	12.407
	St. dev.	(11.599)	(11.655)	(11.307)
	No. subjects	35	38	36
Female	Mean	11.718	14.184	18.265
	St. dev.	(11.229)	(13.312)	(13.814)
	No. subjects	37	34	36
All	Mean	11.623	12.669	15.336
	St. dev.	(11.407)	(12.543)	(12.954)
	No. subjects	72	72	72

- Depending on whether we base the effect size on all participants, or females, we get:
- Between 16-36 groups for the 3 versus 3 , 12-30 for the 3 versus 5.

Power Analysis



Literature

K. Abbink, J. Brandts, B. Herrmann, and H. Orzen. Intergroup conflict and intra-group punishment in an experimental contest game. *American Economic Review*, 100(1):420–47, 2010.

T. Ahn, R. M. Isaac, and T. C. Salmon. Rent seeking in groups. *International Journal of Industrial Organization*, 29(1):116–125, 2011.

G. A. Akerlof and R. E. Kranton. Identity and schooling: Some lessons for the economics of education. *Journal of economic literature*, 40(4):1167–1201, 2002.

S. Bhaumik, S. M. Chowdhury, R. Dimova, and H. Fromell. Native-immigrant identity, communication, and conflict: An experiment. unpublished, 2020.

Literature (cont.)

C. B. Cadsby, M. Servátka, and F. Song. How competitive are female professionals? a tale of identity conflict. *Journal of Economic Behavior & Organization*, 92:284–303, 2013.

J. E. Cameron. A three-factor model of social identity. *Self and identity*, 3(3):239–262, 2004.

M. Casari, J. C. Ham, and J. H. Kagel. Selection bias, demographic effects, and ability effects in common value auction experiments. *American Economic Review*, 97(4): 1278–1304, 2007.

A. Cassar and M. L. Rigdon. Option to cooperate increases women's competitiveness and closes the gender gap. *Evolution and Human Behavior*, 42(6):556–572, 2021.

Literature (cont.)

Y. Chen and S. X. Li. Group identity and social preferences. *American Economic Review*, 99(1):431–57, 2009.

S. M. Chowdhury, J. Y. Jeon, and A. Ramalingam. Identity and group conflict. *European Economic Review*, 90:107–121, 2016.

S. A. Davies-Netzley. Women above the glass ceiling: Perceptions on corporate mobility and strategies for success. *Gender & society*, 12(3):339–355, 1998.

E. Dechenaux, D. Kovenock, and R. M. Sheremeta. A survey of experimental research on contests, all-pay auctions and tournaments. *Experimental Economics*, 18(4): 609–669, 2015.

U. Gneezy, M. Niederle, and A. Rustichini. Performance in competitive environments: Gender differences. *The quarterly journal of economics*, 118(3):1049–1074, 2003.

Literature (cont.)

F. Heine and M. Sefton. To tender or not to tender? deliberate and exogenous sunk costs in a public good game. *Games*, 9(3):41, 2018.

J. S. Hyde. The gender similarities hypothesis. *American psychologist*, 60(6):581, 2005.

E. Katz, S. Nitzan, and J. Rosenberg. Rent-seeking for pure public goods. *Public Choice*, 65(1):49–60, 1990. ISSN 0048-5829. doi: 10.1007/BF00139290. URL http://dx.doi.org/10.1007/BF00139290.

M. Kolmar and A. Wagener. Group identities in conflicts. *Homo oeconomicus*, 36 (3-4):165–192, 2019.

K. A. Konrad. *Strategy and dynamics in contests*. Oxford University Press, 2009.

Literature (cont.)

T. Kugler, A. Rapoport, and A. Pazy. Public good provision in inter-team conflicts: effects of asymmetry and profit-sharing rule. *Journal of Behavioral Decision Making*, 23(4):421–438, 2010.

J. L. Lawless and R. L. Fox. Why are women still not running for public office? Technical report, Brookings Institution, 2008.

R. O. Murphy, K. A. Ackermann, and M. Handgraaf. Measuring social value orientation. *Judgment and Decision making*, 6(8):771–781, 2011.

OpenMoji. Open source emojis for designers, developers and everyone else!, 2020. URL `https://openmoji.org/`.

Literature (cont.)

C. R. Price and R. M. Sheremeta. Endowment origin, demographic effects, and individual preferences in contests. *Journal of Economics & Management Strategy*, 24(3):597–619, 2015.

A. Sen. *Identity and violence: The illusion of destiny*. Penguin Books India, 2007.

R. M. Sheremeta. Behavior in group contests: A review of experimental research. *Journal of Economic Surveys*, 32(3):683–704, 2018.

G. Tullock. Efficient rent seeking. In J. Buchanan, R. Tollison, and G. Tullock, editors, *Toward a Theory of the Rent-Seeking Society*, pages 97 – 112. Texas A & M University Press, 1980.

H. Zaunbrecher and A. Riedl. Social identity and group contests. *Available at SSRN 2816038*, 2016.