Ethics in Norm-Aware Agents

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Examples of Ethical Concerns

Audio leaking: Intrusion of solitude and disclosure of music taste

Source: https://twitter.com/akokitamura/status/728521725172846592

Source: `https://twitter.com/cspan/status/1108422307008184326`

Source: https://twitter.com/TheSimpsons/status/441000198995582976

Tradeoffs: Values of Power, Pleasure, and Benevolence

Socially Intelligent Personal Agent (SIPA)

A SIPA adapts to social context and supports meeting social expectations

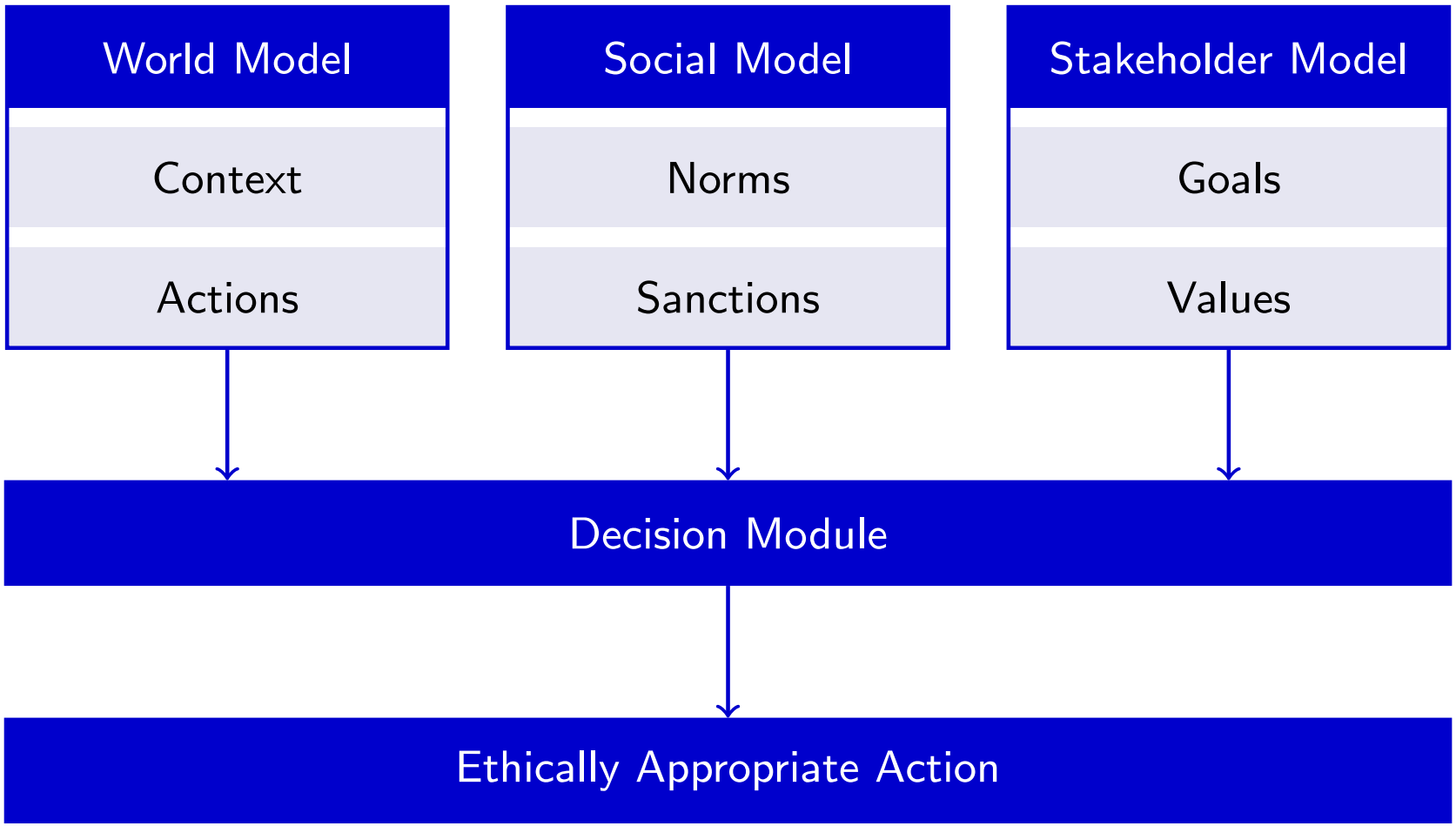
- Ethical: Seeks to balance needs of
  - Primary stakeholder (user), who directly interacts with the agent
  - Secondary stakeholders, who are affected by the agent's actions

Yumbo

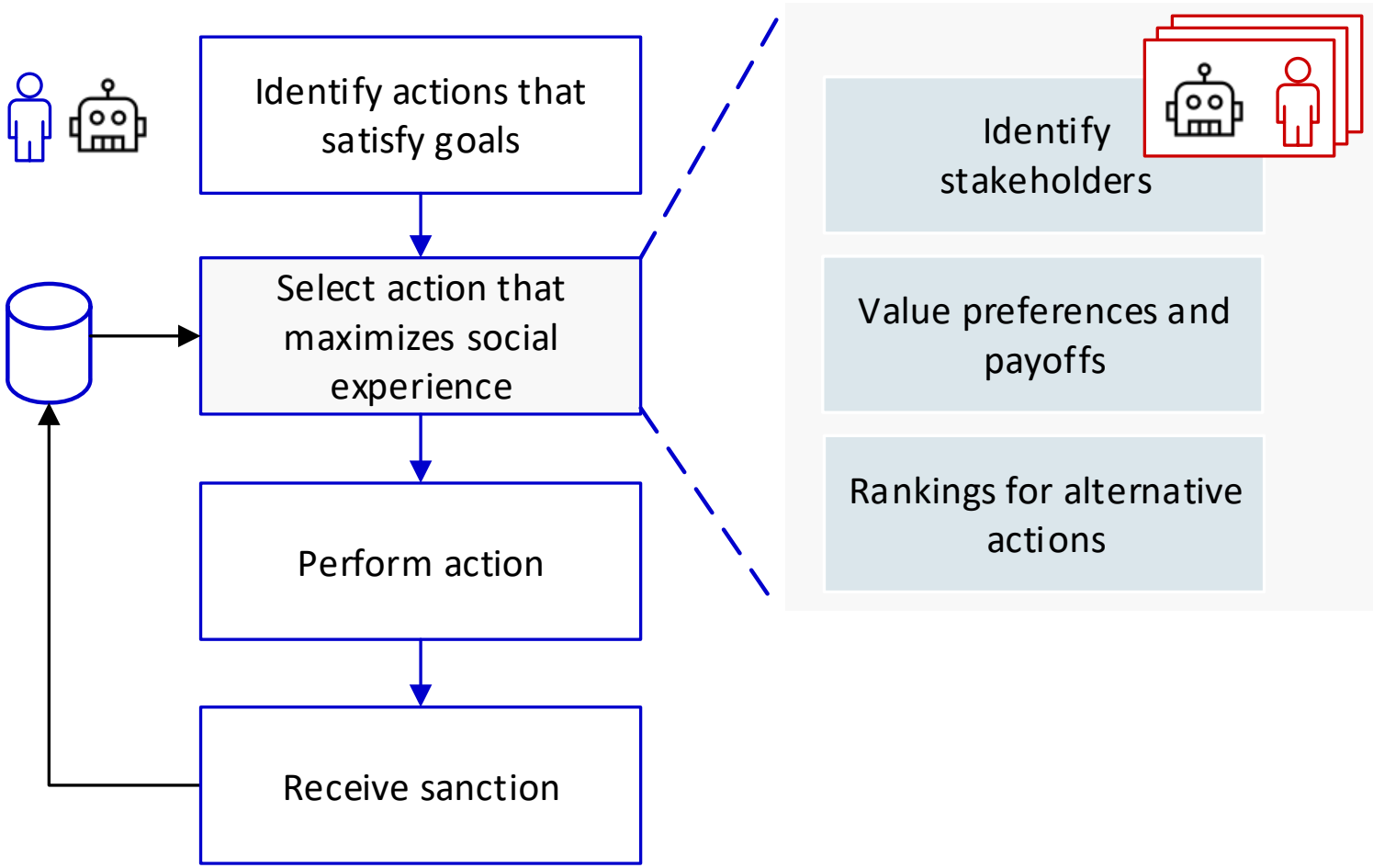
Framework that enables ethical-decision making in light of users having distinct value preferences

- adapts a multi-criteria decision-making approach (VIKOR) [Opricovic, 2004] to identify a consensus action
- addresses decision making by an individual agent but in a social context

A SIPA: Schematically



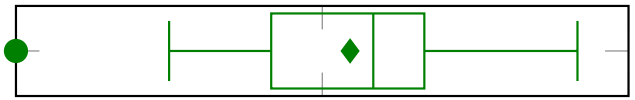
Interaction in Yumbo



Evaluation: Crowdsourcing Study

Participants: 58 students enrolled in a mixed graduate and undergraduate-level computer science course

Privacy attitude survey: Level of comfort in sharing personal information [Schnorff et al., 2014]



Casual Conscientious Cautious

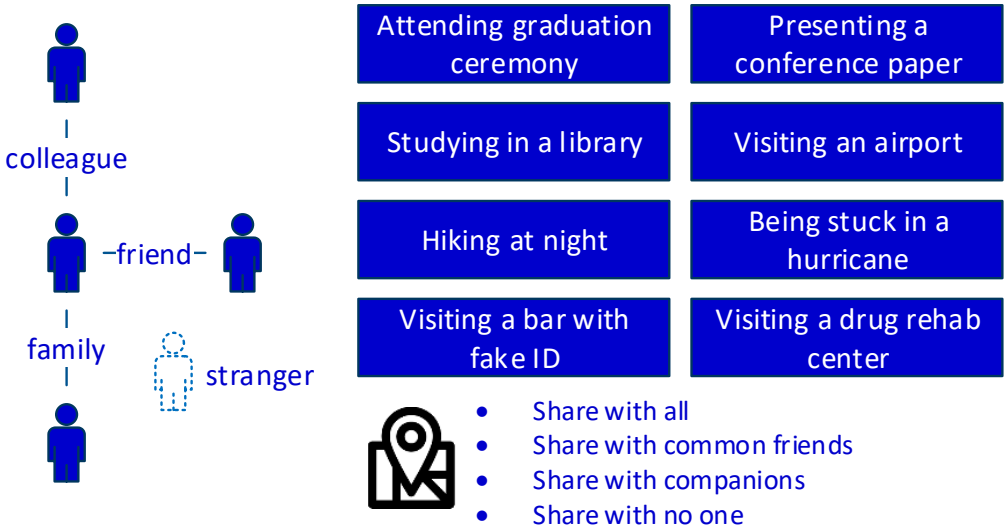
Privacy Attitude

Context sharing surveys: Select context sharing policy

- Phase 1. Based on context, including place and social relationship
- Phase 2. Based on context and values (pleasure, privacy, recognition, safety)

Evaluation: Simulation

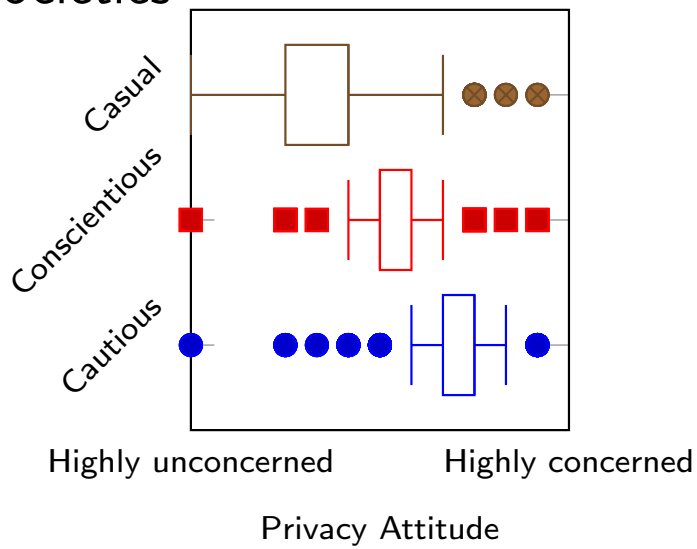
Study unit: A context-sharing SIPA



Simulated societies

- Mixed
- Cautious
- Conscientious
- Casual

Privacy attitude distribution of societies



Decision-making strategies:

S_{Yumbo}: Policy based on VIKOR

$S_{primary}$: Policy based on primary stakeholder's preferences

$S_{conservative}$: Least privacy-violating sharing policy

$S_{majority}$: Most common sharing policy

Metrics

Mean social experience is the mean utility obtained by a society as a whole based on context sharing policy decisions

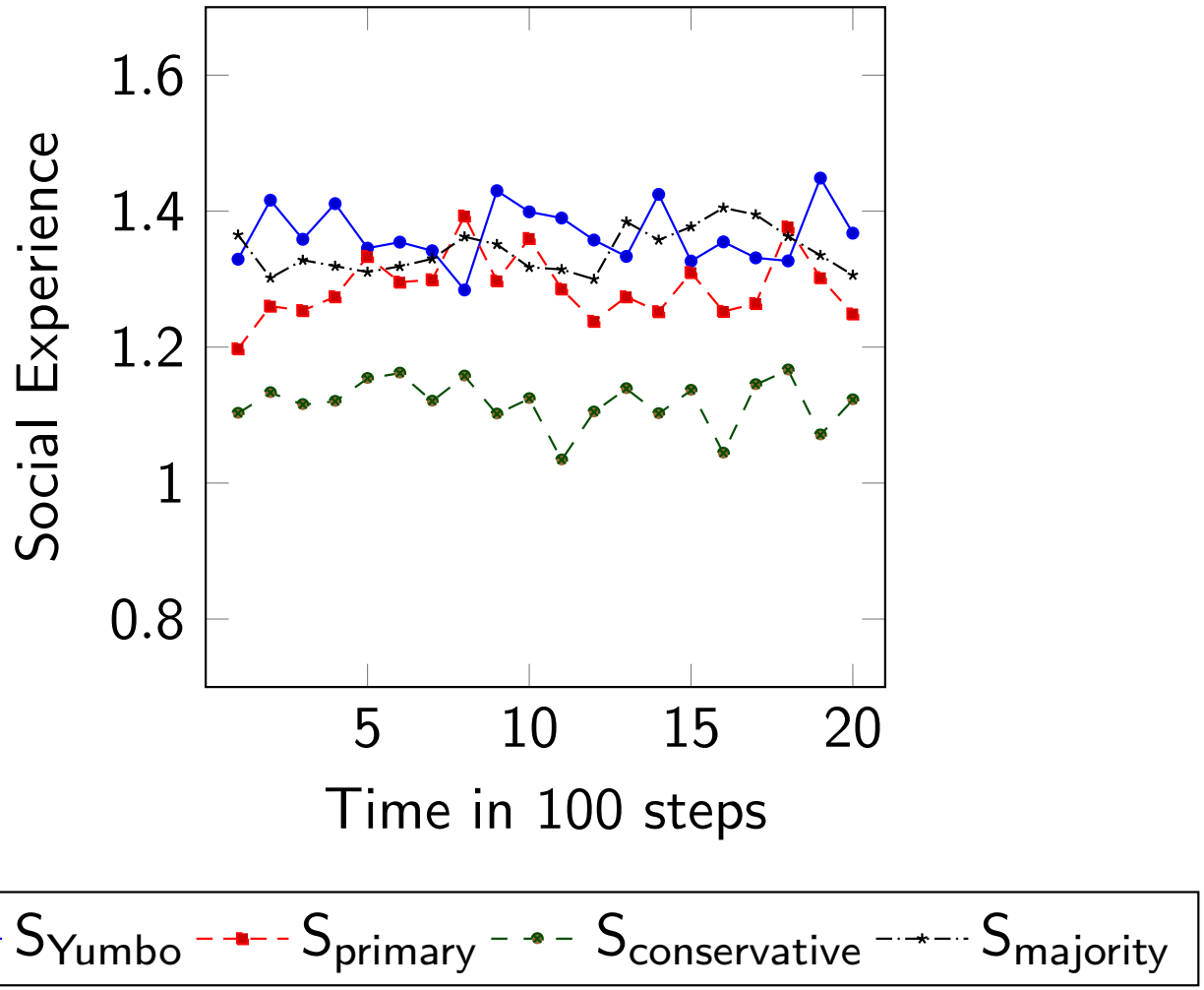
Best individual experience is the maximum utility obtained by one or more of the SIPA's stakeholders during a single interaction

Worst individual experience is the minimum utility obtained by one or more of the SIPA's stakeholders during a single interaction

Fairness is the reciprocal of the difference between the best and worst individual experience

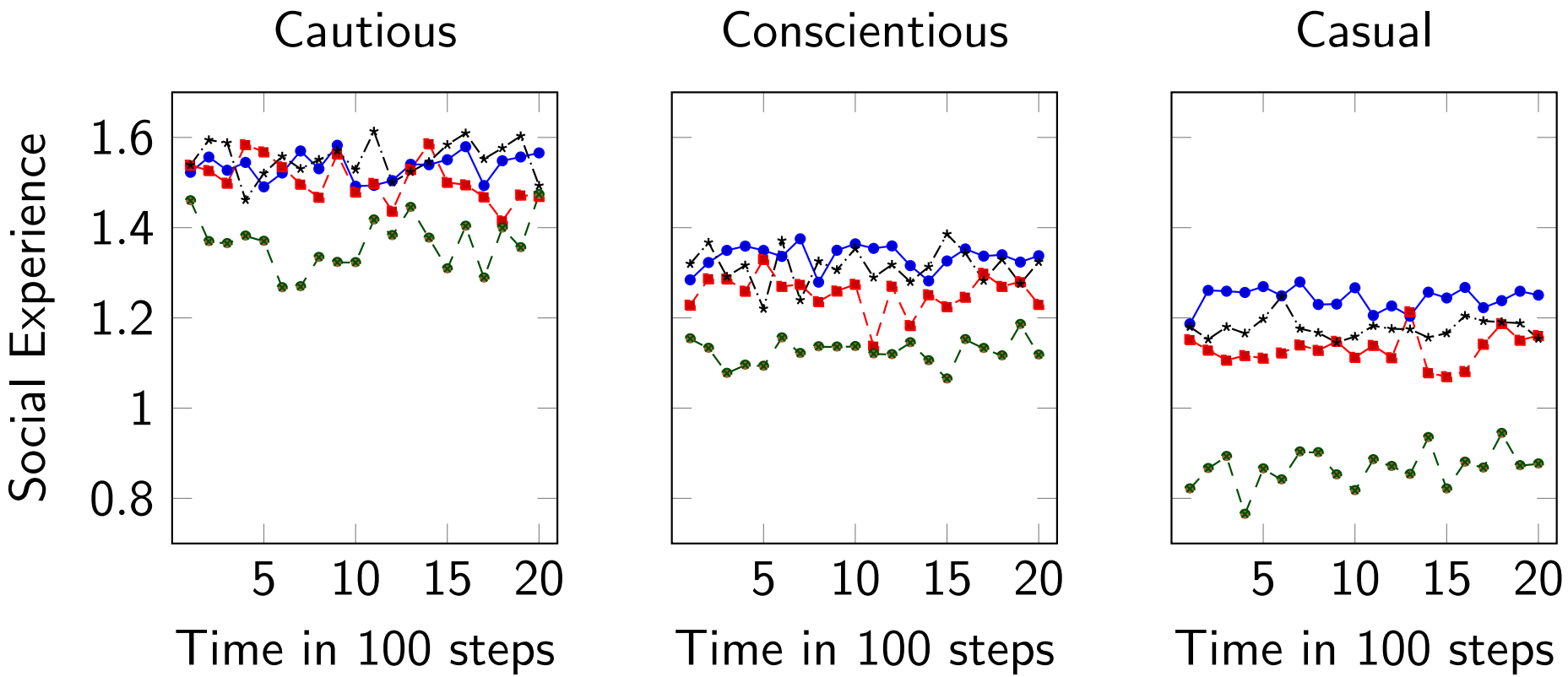
Experiment with Mixed Privacy Attitudes

Result: Yumbo yields better mean social experience, mean worst individual experience, and fairness than other decision-making strategies



Experiments with Majority Privacy Attitudes

Result: Yumbo maximizes the worst individual experience and yields better fairness than other decision-making strategies



Conclusions

Ethics inherently involves looking beyond one's self interests

Yumbo

- advances science of security and privacy by tackling a nuanced notion of privacy—understood as an ethical human value
- considers users other than primary users
  - accommodates stakeholders' value preferences in its decision making
  - demonstrates the gains in fairness accruing

Thank You

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`http://research.csc.ncsu.edu/mas/`

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VIKOR Calculations

Policy Alternatives	Frank's Values				Hope's Values				S_y	R_y	Q_y
	Ple	Pri	Rec	Saf	Ple	Pri	Rec	Saf			
y_1 All	10	5	10	5	5	0	5	5	3.5	3	0.75
y_2 Common	5	5	5	10	5	0	5	5	0.4	3	1
y_3 Andrew	0	5	0	0	5	15	5	5	**0.3**	**1**	**0**
w_x	1	1	1	1	1	3	1	1			
f_x^*	1	0	1	1	0	1	0	0			
f_x^-	0	0	0	0	0	0	0	0			

$k = 0.5$, $w_{Hope-privacy} = 3$

Places in the Simulation

Place	Safe	Sensitive
Attending graduation ceremony	–	No
Presenting a conference paper	–	No
Studying in library	Yes	–
Visiting airport	Yes	–
Hiking at night	No	–
Being stuck in a hurricane	No	–
Visiting a bar with fake ID	–	Yes
Visiting a drug rehab center	–	Yes

Example Numeric Utility Matrix for a Stakeholder

Place	Companion	Policy	Value			
			Pleasure	Privacy	Recognition	Security
Graduation	Family	All	1	0	1	0
Conference	Co-workers	None	0	1	0	0
Library	Friends	All	1	0	0	0
Airport	Friends	Common	0	1	0	0
Hiking	Alone	All	1	0	0	1
Hurricane	Family	All	1	0	0	1
Bar	Alone	None	0	2	0	0
Rehab	Friends	None	0	2	0	0

Comparing Social Experience and Fairness for Mixed Privacy Attitudes

Strategy	Mean	Best	Worst	Fairness	p
S_{Yumbo}	**1.361**	1.715	**0.767**	**1.05**	–
$S_{primary}$	1.286	1.789	0.579	0.83	<0.01
$S_{conservative}$	1.106	1.721	0.472	0.80	<0.01
$S_{majority}$	1.339	**1.836**	0.570	0.78	<0.01

Comparing Social Experience and Fairness for Majority Privacy Attitudes

Strategy	Cautious				Conscientious				Casual			
	M.	B.	W.	F.	M.	B.	W.	F.	M.	B.	W.	F.
S_{Yumbo}	1.535	1.664	**1.233**	**2.27**	**1.329**	1.531	**0.867**	**1.51**	**1.242**	1.457	**0.768**	**1.45**
$S_{pri.}$	1.506	1.766	1.082	1.46	1.253	1.592	0.679	1.10	1.129	1.466	0.584	1.13
$S_{cons.}$	1.366	1.745	1.059	1.46	1.093	1.519	0.608	1.10	0.870	1.338	0.454	1.34
$S_{maj.}$	**1.551**	**1.858**	1.007	1.18	1.318	**1.699**	0.575	0.89	1.176	**1.534**	0.518	0.98

Location Sharing Survey: Policy Selection

Companion	Check-in Policy			
	Share with all	Common friends	Companions	No one
Alone	○	○	○	○
Colleague	○	○	○	○
Friend	○	○	○	○
Family member	○	○	○	○
Crowd	○	○	○	○