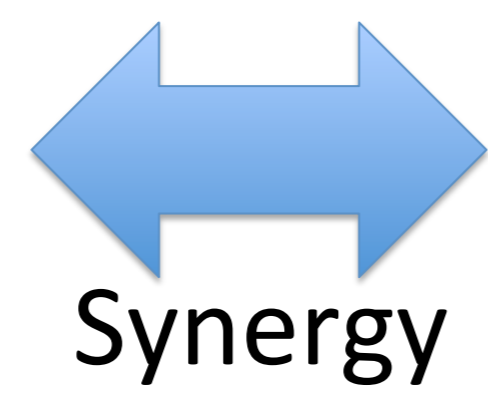


Open Census for addressing False Identity Attacks in Agent-based Decentralized Social Networks

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Decentralized Census Problem (DCP)

Identity Verification



Census

Witnessing: extension to PGP (EPGP)

Can witness/certify for and against somebody's qualities.

Decentralized Census Process

Generate and disseminate identities & witness stances (EPGP) on qualities like:

- voting eligibility, ψ
- reliability in witnessing, ϕ

Each user reasons with a Bayesian Network and has her own result.

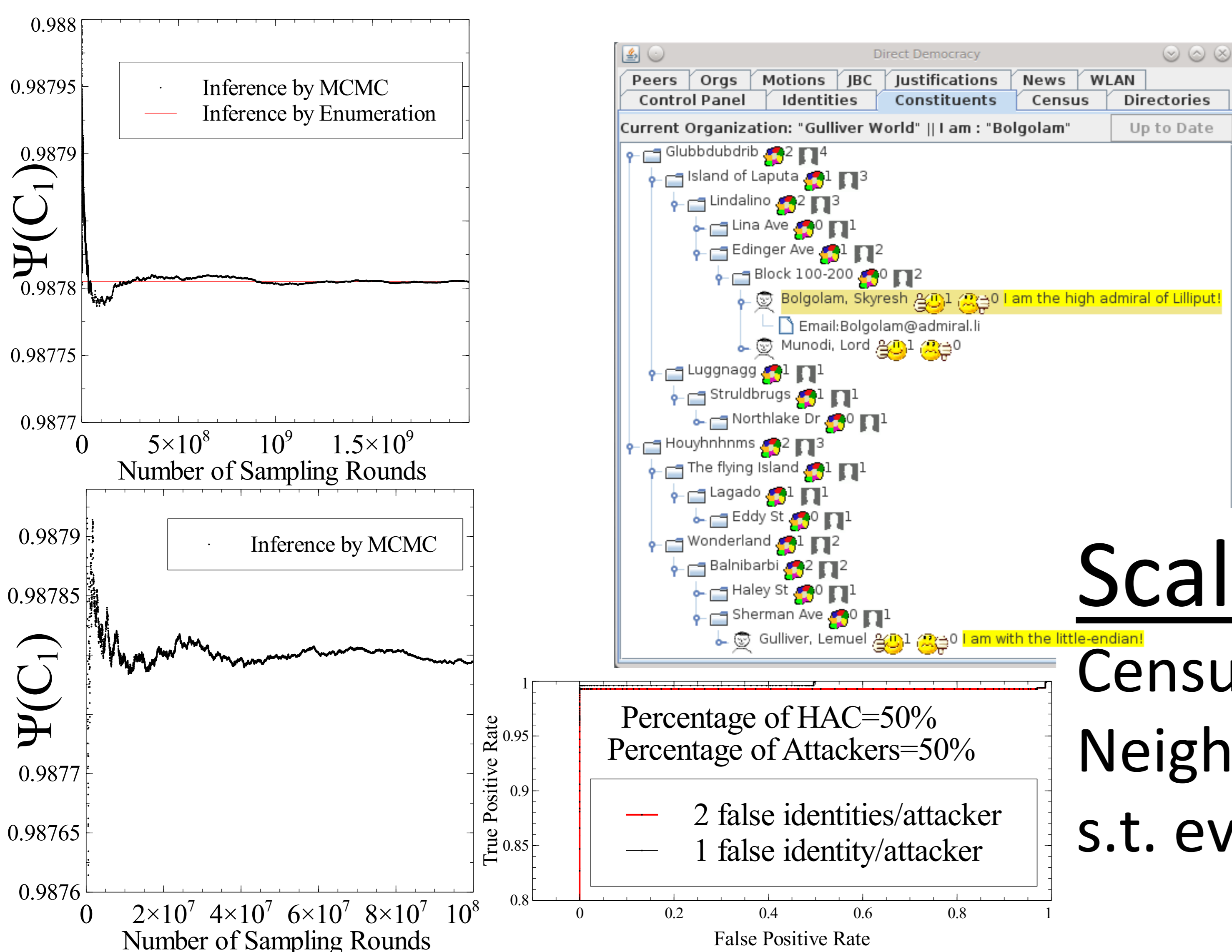
Statistics of a predicate f , (e.g., "has opinion x "):

$$E[[f]] = \sum_{s \in \text{Identities}} \Psi(s) f(s) \quad E[[census]] = \sum_{s \in \text{Identities}} \Psi(s)$$

Probabilities of quality ψ are inferred from the Bayesian Net of the observer.

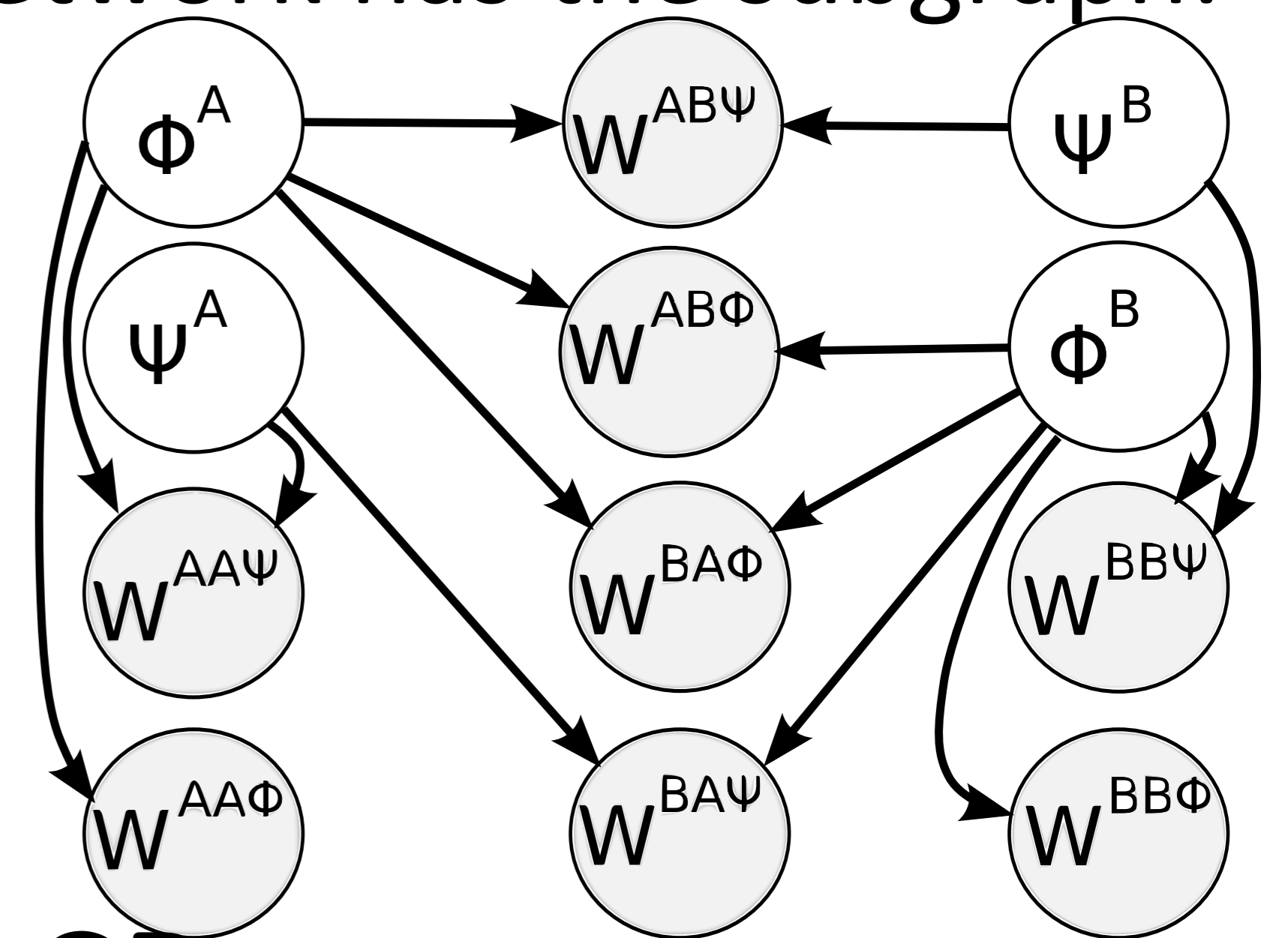
Experimental Results

Markov Chain Monte Carlo is used in agents from <http://DirectDemocracyP2P.net>
HAC – Honest Active Constituents



Bayesian Network for DCP

For each users A and B, and available witness stances between them, the Belief Network has the subgraph:



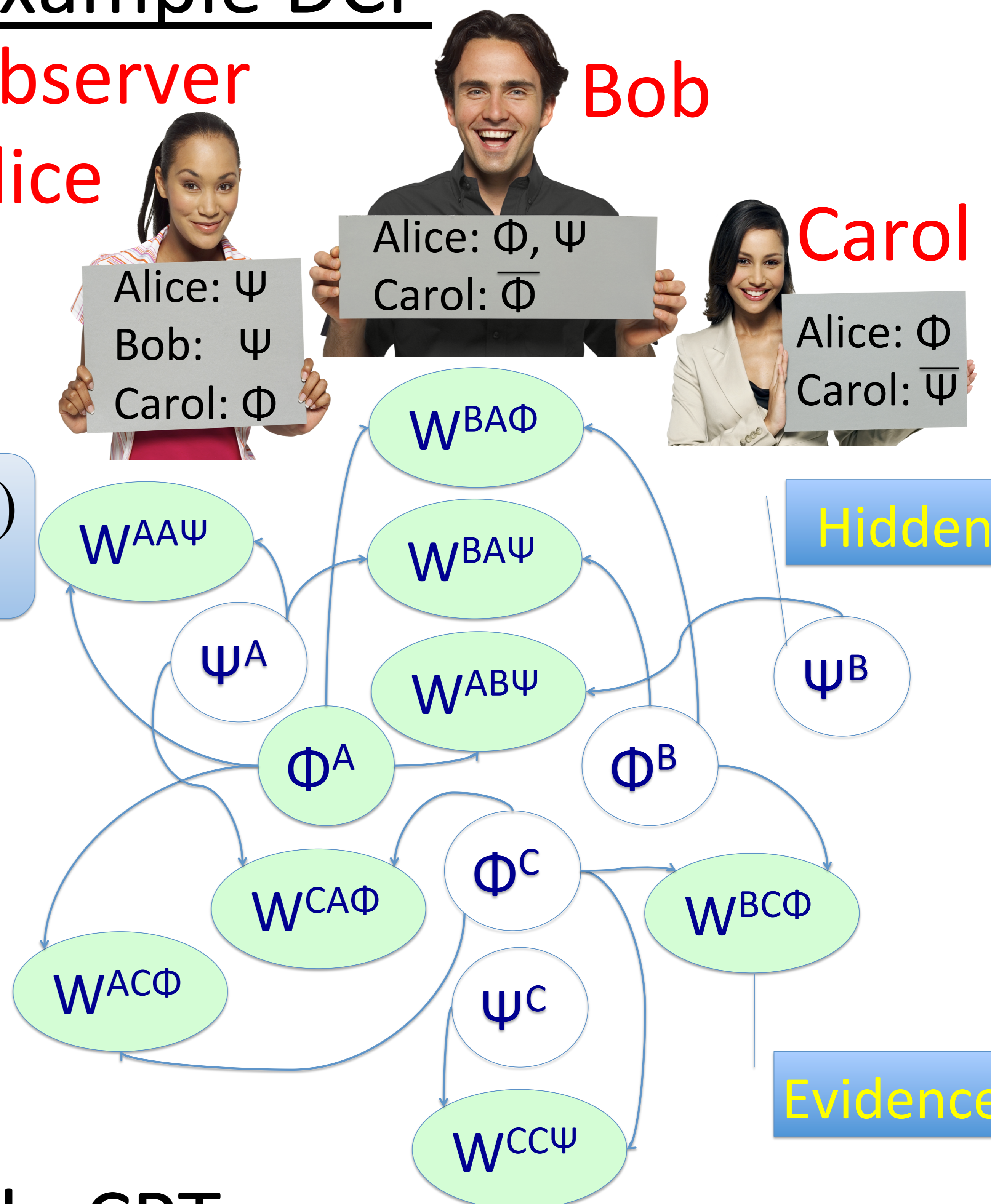
Example DCP

Observer

Bob

Alice

Carol



Sample CPT

For each pair of identities A, B and for each available witness stance, CPTs look as here:

ψ^A	ϕ^B	$P(W^{BA\psi})$	ϕ^A	ϕ^B	$P(W^{BA\phi})$
t	t	0.9	t	t	0.9
t	f	0.5	t	f	0.5
f	t	0.1	f	t	0.3
f	f	0.5	f	f	0.5

ψ^A	ϕ^A	$P(W^{AA\psi})$	ϕ^A	$P(W^{AA\phi})$
t	t	0.99	t	0.99
t	f	0.5	f	0.5
f	t	0.1	$P(\phi)$	$P(\psi)$
f	f	0.5	0.5	0.99

Scalability: Neighborhoods

Census is computed separately on each neighborhood
Neighborhoods are organized in a tree hierarchy
s.t. everybody can certify his ancestor nodes's children.