

Leveraging Social Capital to Access Resources

Matthew Smith

<http://m.smithworx.com>

Christophe Giraud-Carrier

cgc@cs.byu.edu

Samuel Stephens

Brigham Young University

<http://dml.cs.byu.edu>

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DML

Data Mining Lab

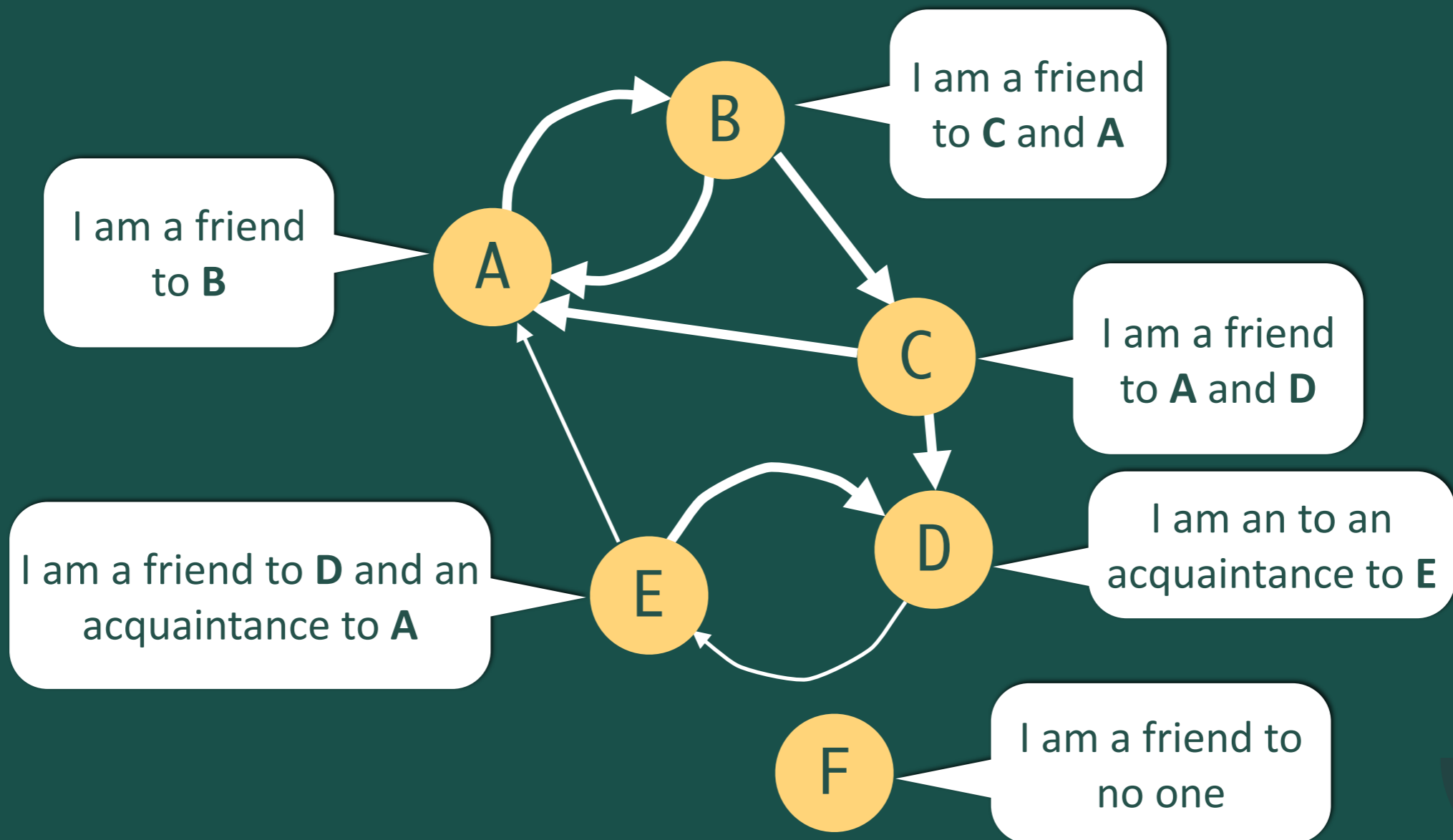
Introduction

- 📌 **Computational Social Science**
- 📌 **Social Capital** - our networks can provide value
- 📌 **Social Capital and Social Resources**
 - 📌 *Access to and use of resources (assets) embedded in social networks* - Lin 2001
- 📌 **Social Capital Framework**
 - 📌 Relationships (ESN), Affinities (IAN), and *Resources*



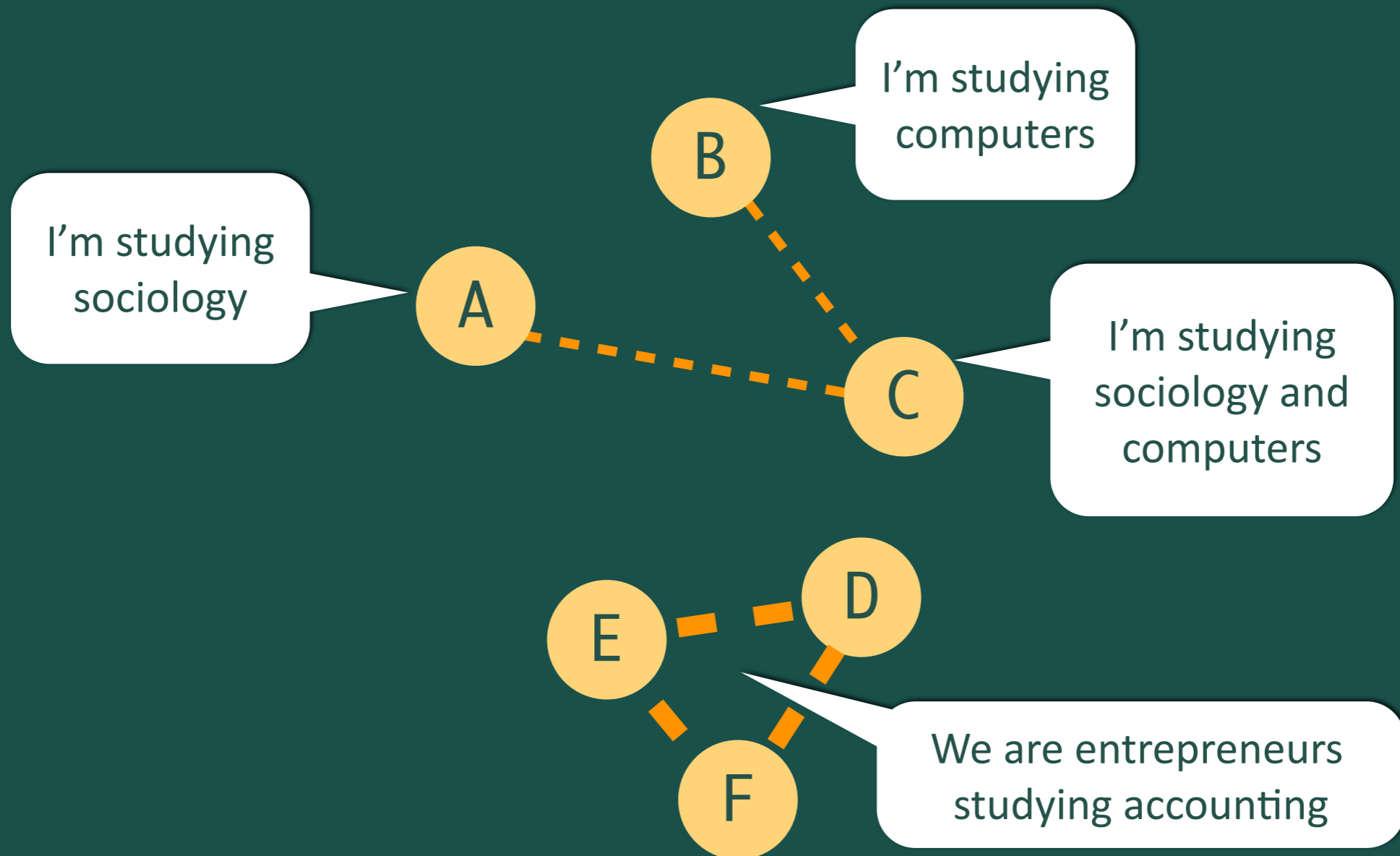
Framework: ESN

📌 Explicit Social Network (ESN)



Framework: IAN

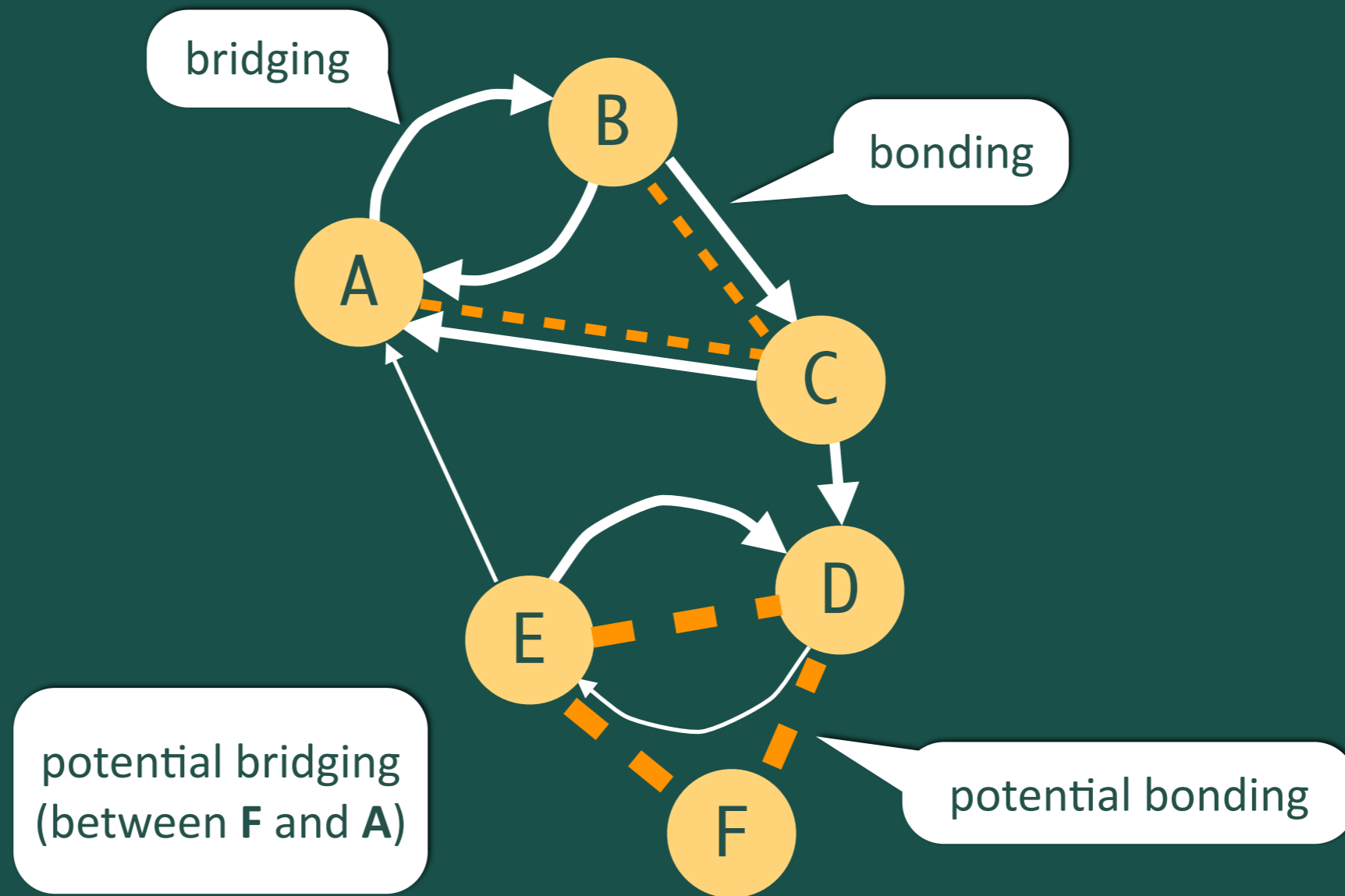
Implicit Affinity Network (IAN)



Smith, M., Giraud-Carrier, C. and Judkins, B. (2007). Implicit Affinity Networks. In Proceedings of the Seventeenth Annual Workshop on Information Technologies and Systems, 1-6.



Framework



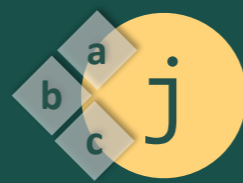
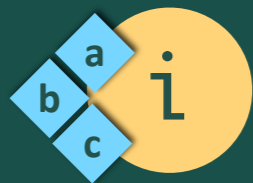
Smith, M., Giraud-Carrier, C., and Purser, N. (2009). Implicit Affinity Networks and Social Capital. *Information Technology and Management*, 10(2-3):123-134, September.



Resources



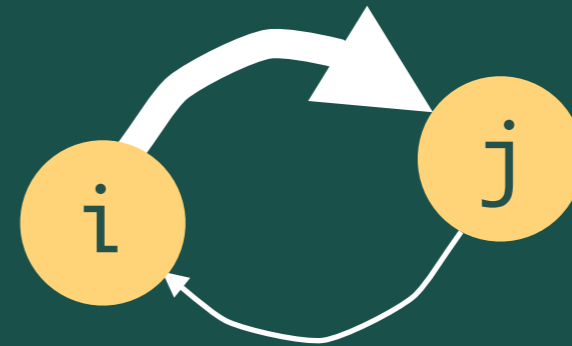
- 📌 **Social resource** - a specific asset, material or symbolic, available through social connections within a network
- 📌 **Characteristics** - examples: (e.g., exhaustible, returnable, quantifiable, durable)
- 📌 **Value** - assigned by the individual (often dependent on characteristics)
- 📌 **Possessed or Sought**



Relationships

📌 Directed

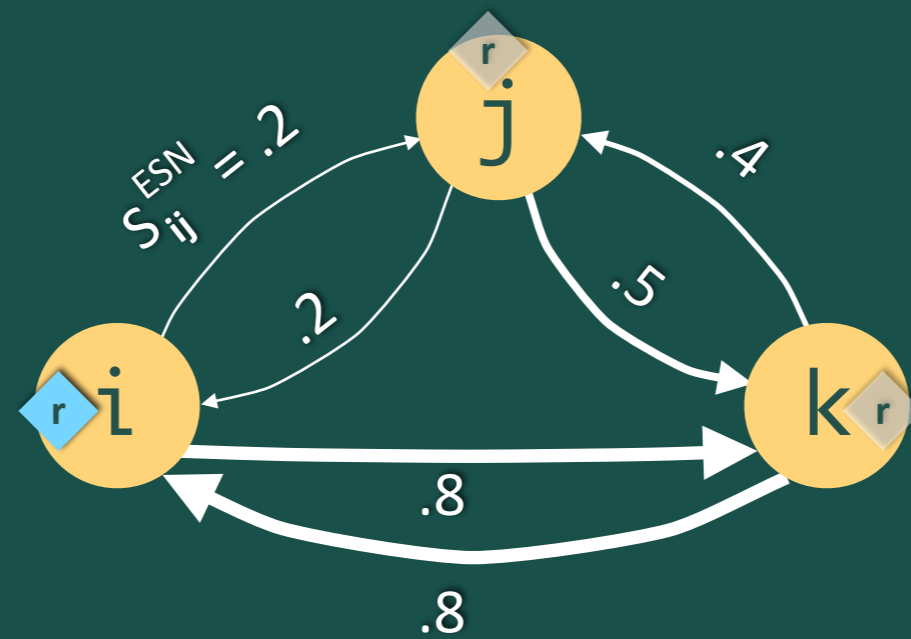
📌 Strength



- 📌 *Initialization*: Behavioral interaction, evaluation of one person by another, formal relationships, biological relationships; base on affinities
- 📌 *Dynamic*: interactions, time decay



Access to Resources

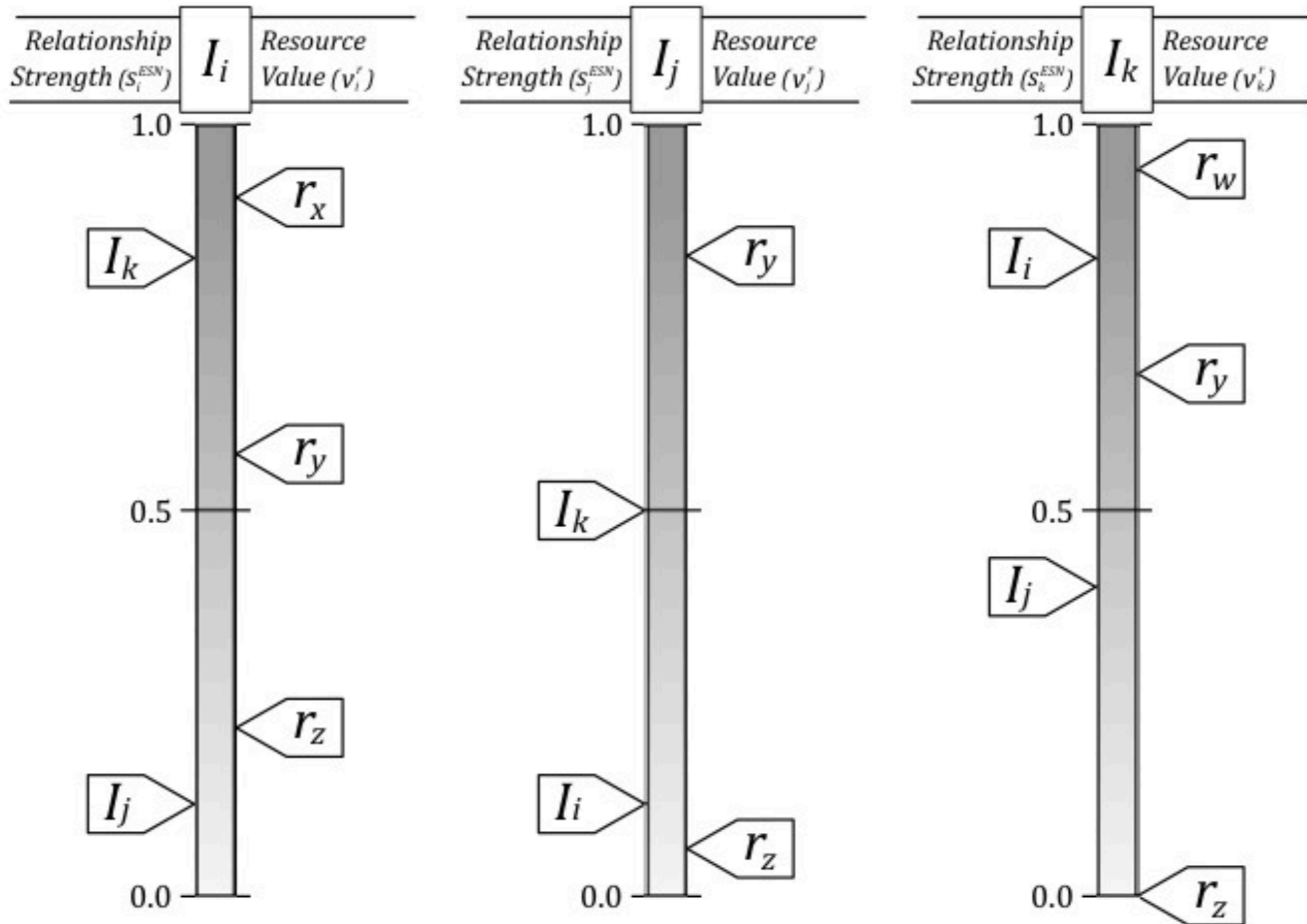


$$v_i^r = 0.4$$

$$access_j(i, r) = \begin{cases} True & \text{if } s_{ij}^{ESN} \geq v_i^r \\ False & \text{otherwise} \end{cases}$$



Resource Access Spectrum



Comparison of SCF to Popular Applications

<i>Feature</i>	FB	TW	LI	FC	SW	SCF
relationships						
simple (friend or not)	✓	✓	✓			✓
complex (strength)						✓
asymmetric		✓				✓
dynamic						✓
affinities						
simple (like or not)	✓		✓			✓
complex (how much)						✓
resources						
desired by ego				✓	✓	✓
desired by others				✓		✓
available by ego				✓	✓	✓
...willing to give				✓	✓	✓
...to specific others						✓
available by others				✓	✓	✓
...willing to give				✓	✓	✓
...to ego						✓
dynamic rel. (on exchange)						✓
...update on giving						✓
...update on receiving						✓



Example Experiment:

NetLogo Simulation

The image displays the NetLogo simulation interface for a network experiment. The central view shows a network of 10 nodes (represented by stick figures) connected in a fully-connected manner, with green lines representing relationships. The nodes are arranged in a circular pattern, and each node is connected to every other node.

Control Panels:

- Network Choice:** fully-connected
- Initial Resource Distribution:** disparately
- Parameters:** number-of-nodes: 10, number-of-resources: 10, number-of-unique-resour...: 26, global-hold-onto...: 5
- Labels and Colors:** color-initial: 5 (gray), color-recei...: 24 (orange...), color-giver: 65 (lime)
- Simulation Controls:** drag?, show-resource-flow?, show-edge-labels?, global-strength-thre...: 0.50, edge-strength-thres...: 0.50
- Buttons:** redraw, step, go
- Options:** go-by-round?, shuffle-turn-o..., take-resources?, give-resources?, turn-interacti..., verbose?
- Global Settings:** relationship-proba...: 0.00, desired-resource-vector, sc-count-dup-resources?, sc-count-diff-resources-only?, resources-are-info?
- Resource Management:** create-resources: none, max-create-prob: 0.15, destroy-resources: none, max-destroy-p...: 0.15, color-defe...: 35 (brown), color-freer...: 15 (red)
- Defectors and Freeriders:** defectors?, p-defect...: 0.010, freerider..., p-freer...: 0.0050
- Statistics:** total-social-capital: 90, total-relationships: 90
- Graphs:** Social Capital (sc vs time), Relationships (vs time), Social Capital Histogram (Nodes vs Social Capital), Resource Distribution (ber of N vs Number of Reso...)
- Current Round:** current-round: 0, move-ic: 0
- Decay Settings:** decay-stale-re..., rounds-to-decay: 5
- Hold Settings:** hold-rels-constant?
- Boost and Decay Values:** boost-val: 1, decay-val: 1, bigboost-val: 4, bigdecay-val: 2

Summary

- Presented general framework that:
 - Leverages relationships, affinities, and resources
 - Operationalizes SC in online communities
- Compared SC framework to popular applications
- Showed an example experiment highlighting interesting boundary cases



Case Studies

- 📌 **Social Capital in the Blogosphere: A Case Study** (published in *Papers from the AAAI Spring Symposium on Social Information Processing*)
- 📌 **Bonding vs. Bridging Social Capital: A Case Study in Twitter** (published in *International Symposium on Social Intelligence and Networking*)
- 📌 **Identifying Health-Related Topics on Twitter** (published at *International Conference on Social Computing, Behavioral-Cultural Modeling, & Prediction - SBP11*)
- 📌 **Social Capital and Language Acquisition during Study Abroad** (submitted to *Cognitive Science*, 2011)



Questions & Comments

Ask me now:



Email or Call me:

Matt Smith
smitty@byu.edu
(801) 788-4920

Connect:

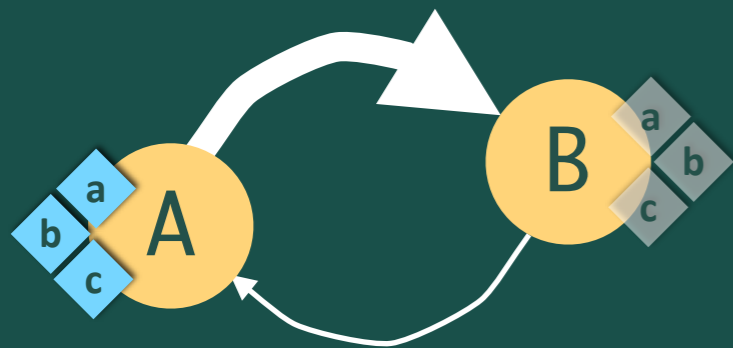
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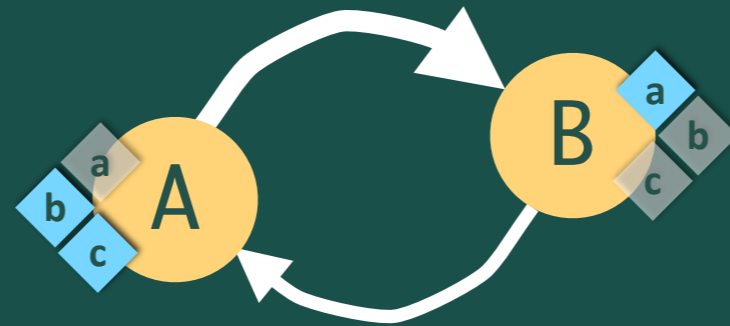
Extra Slides

Reciprocity



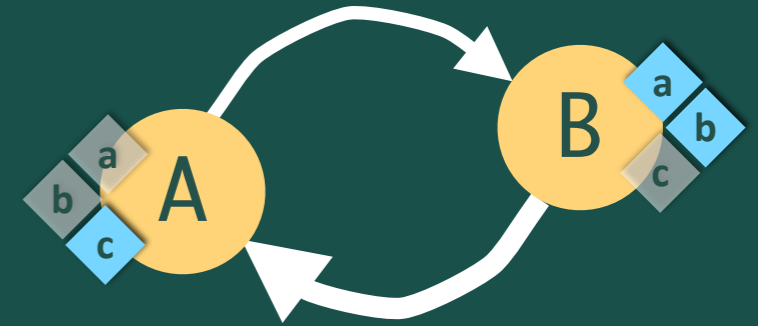
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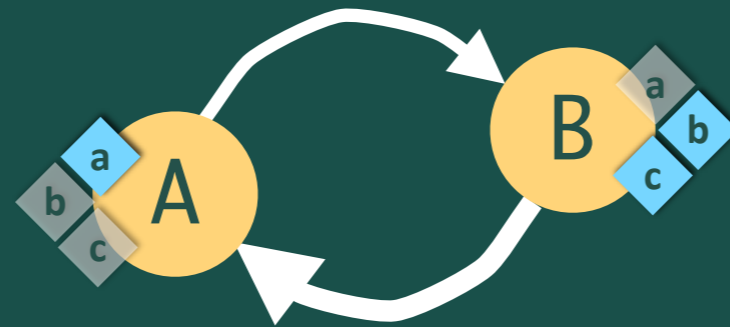
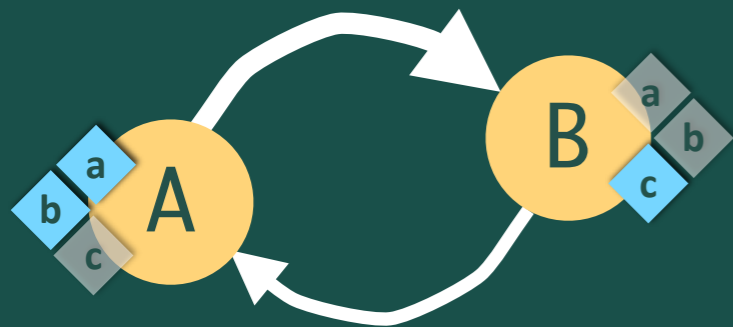
2

5



3

4



Interactions

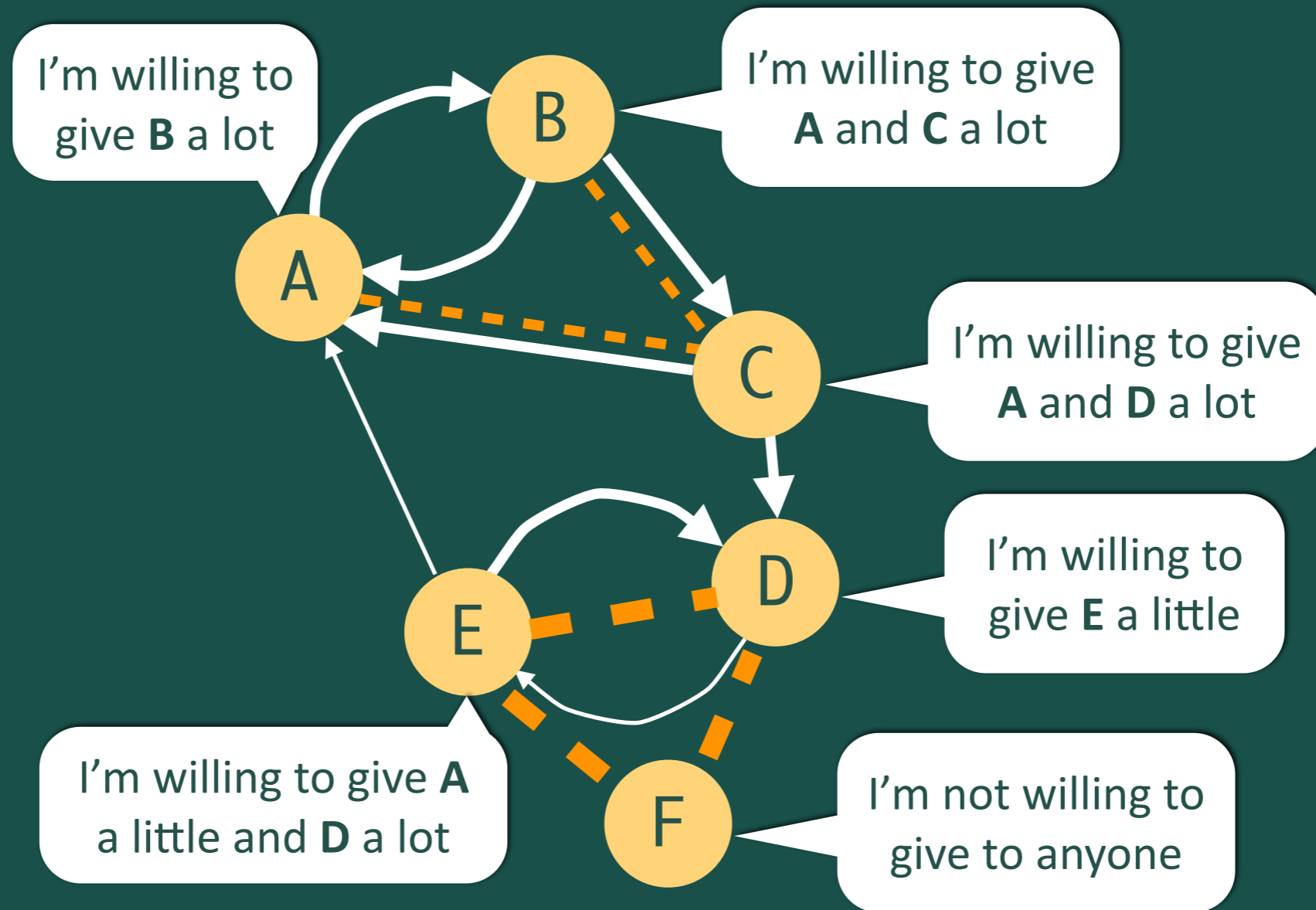
- How is it perceived? (+, -, or neutral)
- Is a resource involved?
- Who to interact with?

$$i = sel_j(R_i^p, R_j^s, s_{ij}^{ESN}, s_{ij}^{IAN})$$

where

- R_i^p : Set of resources currently possessed by i
- R_j^s : Set of resources currently sought by j
- s_{ij}^{ESN} : Strength of the explicit link from i to j
- s_{ij}^{IAN} : Strength of the implicit affinity between i and j

Framework

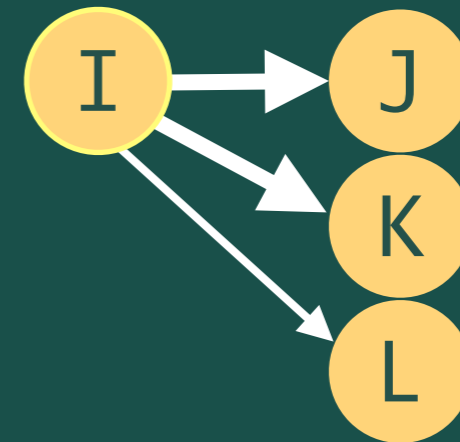


Relationship Strength Modeling

- 📌 Initialized individually

- 📌 Frequency of interaction (data)

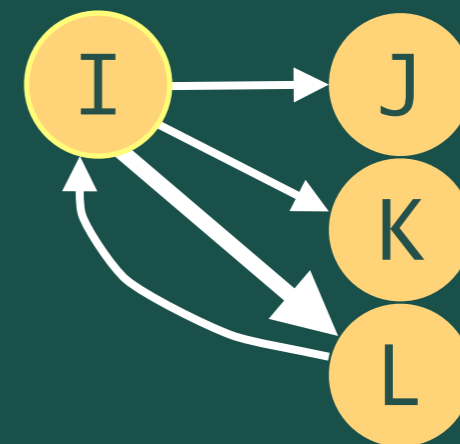
- 📌 Relationship roles (e.g., friend, acquaintance)



- 📌 Dynamic

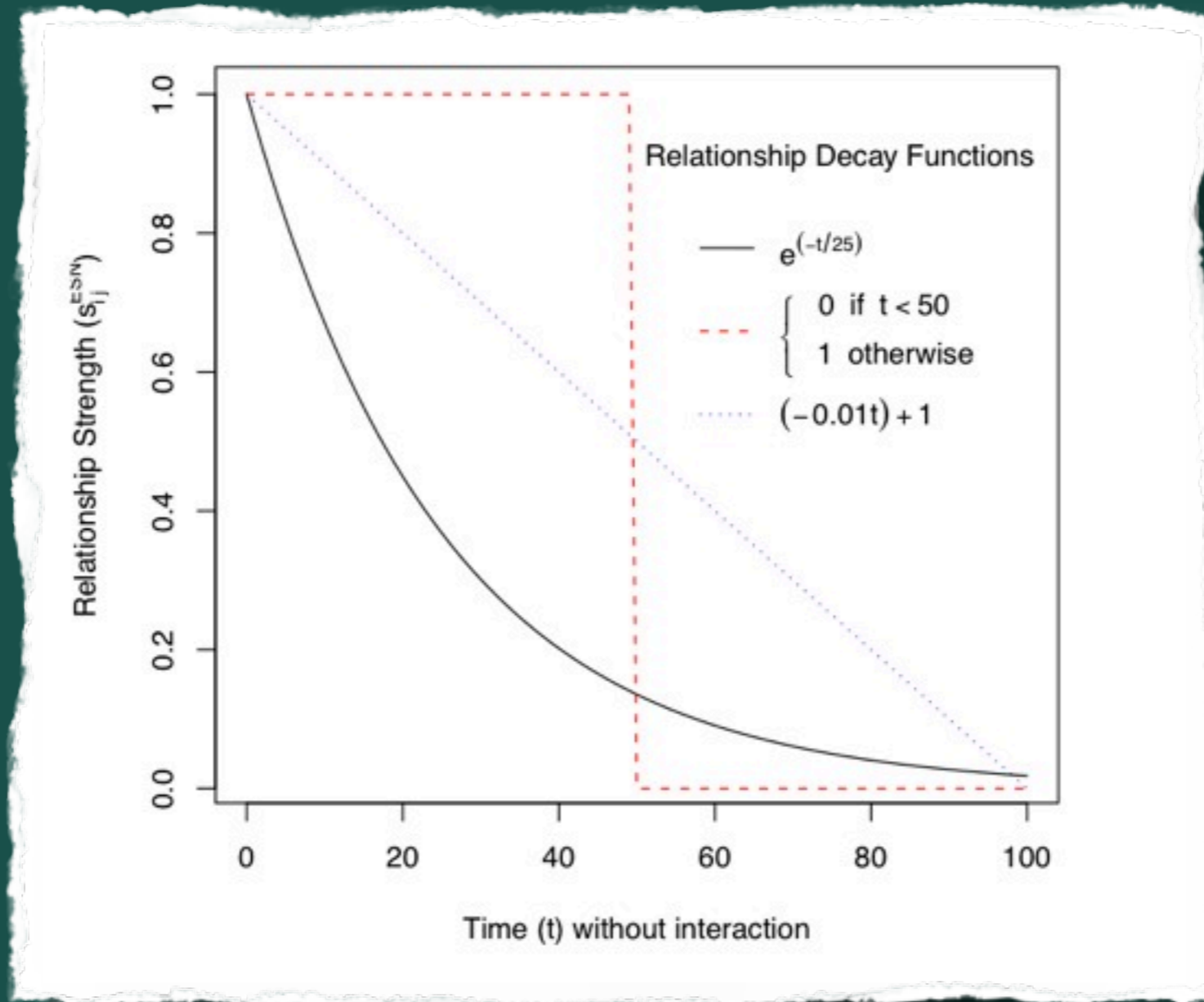
- 📌 Strengthens by interaction

- 📌 Weakens by lack of interaction

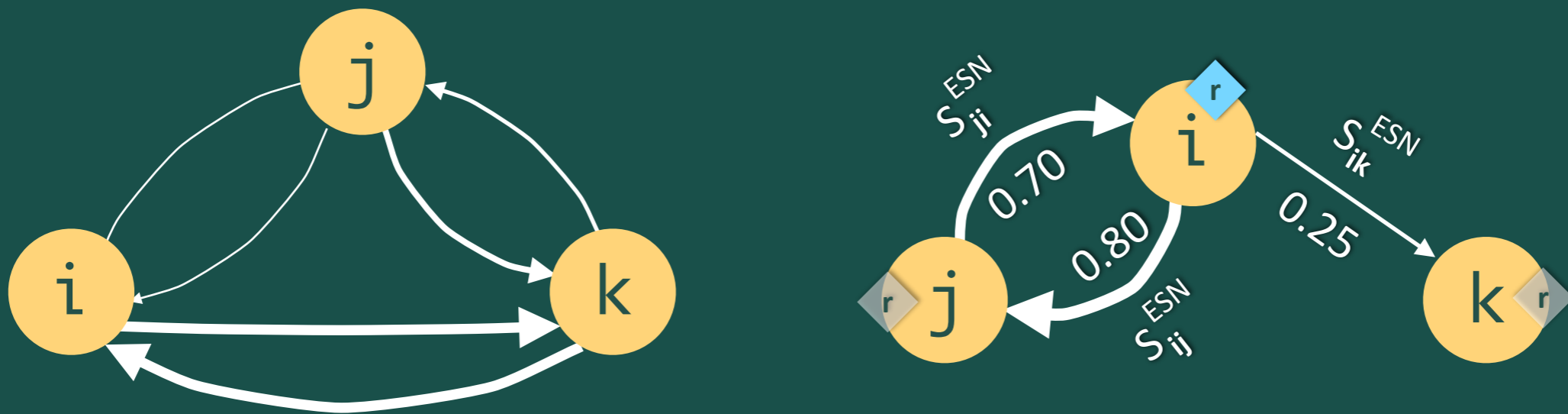


Relationship Decay

Example Functions



Access and Mobilization



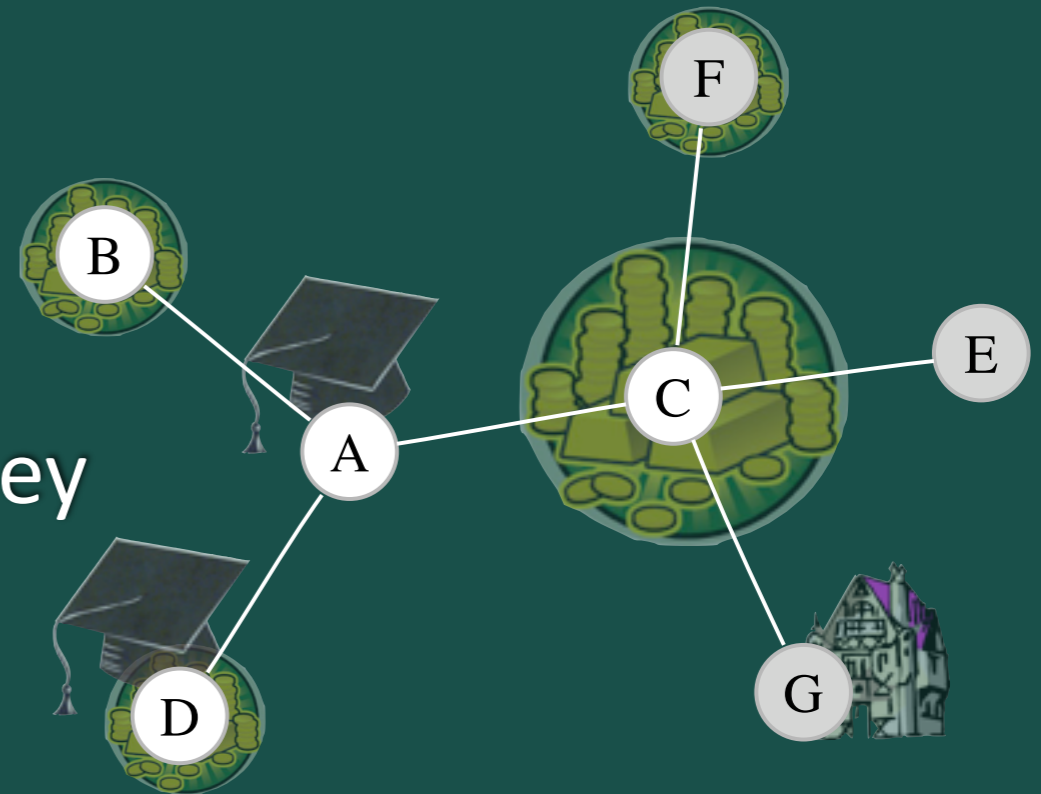
Social Resource Examples

- Material Goods

- land, houses, car, and money

- Symbolic Goods

- education, memberships in clubs, honorific degrees, nobility or organizational titles, family name, reputation, or fame



From: Lin 2001, Social Capital: A Theory of Social Structure and Action