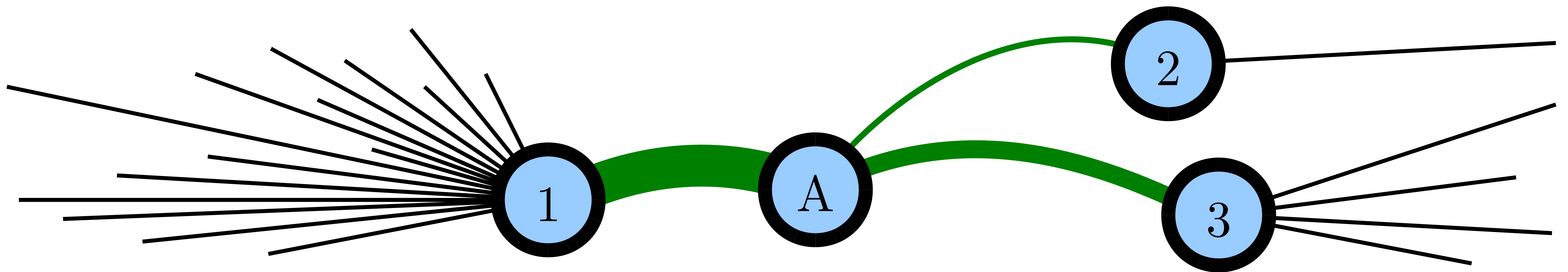


# Preferential Attachment in Online Networks: Measurement and Explanations



$$P(\{A, i\}) = f(d(i))$$

$f(d) \sim 1$  Erdős–Rényi model

$f(d) \sim d$  Barabási–Albert model

$f(d) \sim d^\beta, \beta < 1$  Sublinear model

$f(d) \sim d^\beta, \beta > 1$  Superlinear model

## Measurement

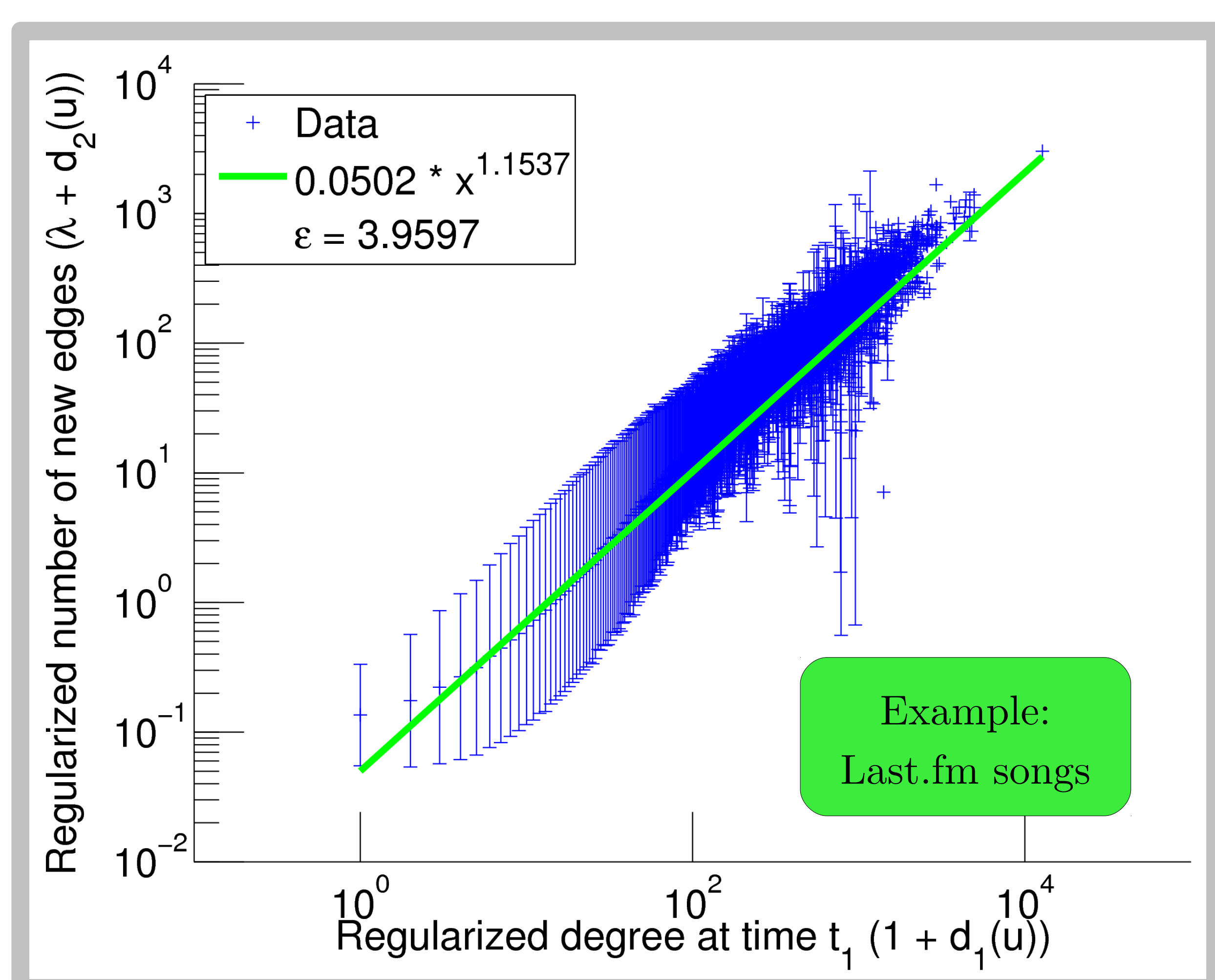
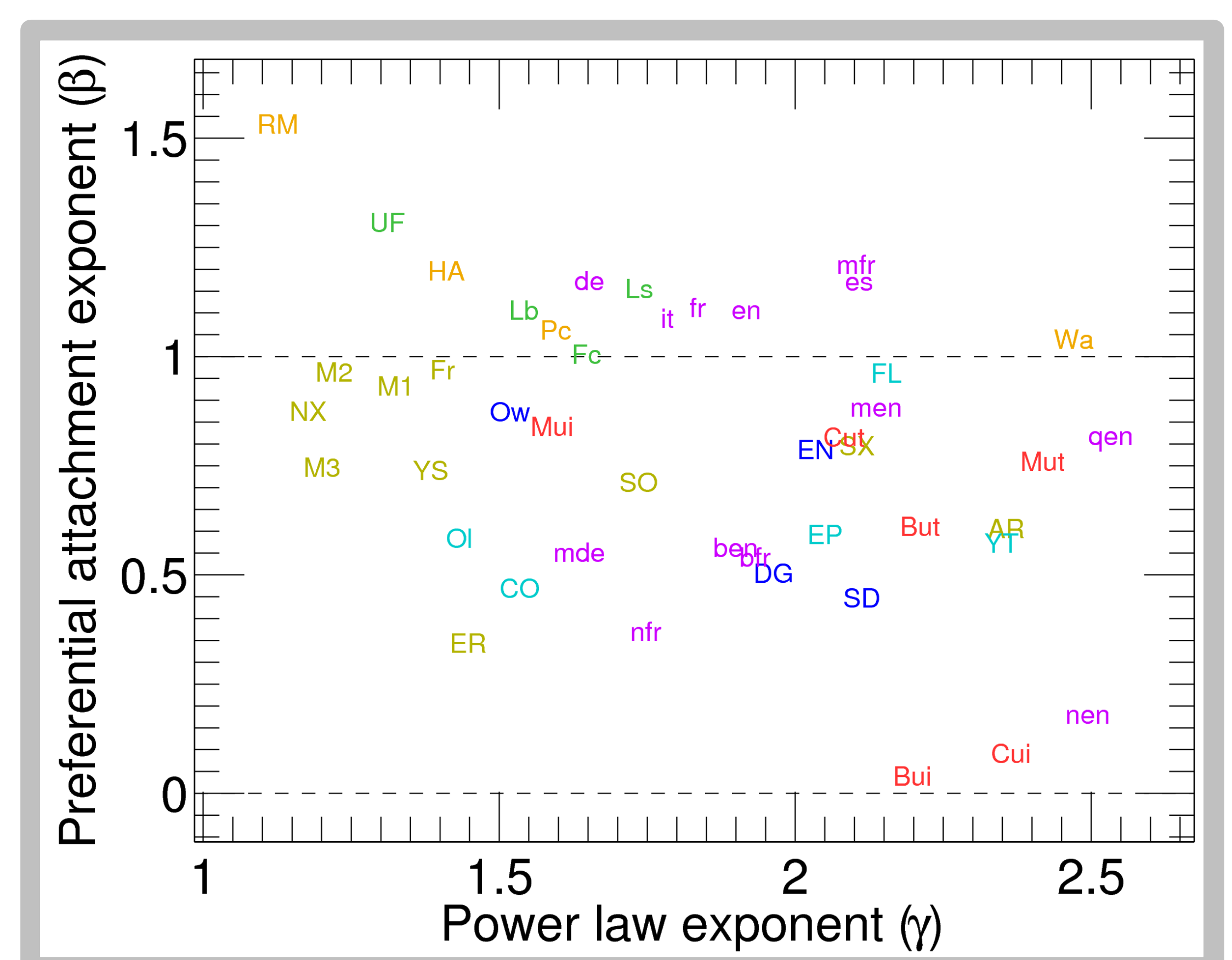
Exploit temporal information: old and new degree  $d_1, d_2$

$$f(d) = e^\alpha (1 + d)^\beta - \lambda$$

$$\min_{\alpha, \beta} \sum_{u \in V} (\alpha + \beta \ln[1 + d_1(u)] - \ln[\lambda + d_2(u)])^2$$

$$\varepsilon = \exp \left\{ \sqrt{1 / |V| \sum_{u \in V} (\alpha + \beta \ln[1 + d_1(u)] - \ln[\lambda + d_2(u)])^2} \right\}$$

## Explanations



<span style="color: cyan;">■</span>	Social network	$\beta < 1$
<span style="color: olive;">■</span>	Rating network	$\beta < 1$
<span style="color: blue;">■</span>	Communication network	$\beta < 1$
<span style="color: red;">■</span>	Folksonomy	$\beta < 1$
<span style="color: magenta;">■</span>	Wiki edit network	
<span style="color: orange;">■</span>	Explicit interaction network	$\beta > 1$
<span style="color: green;">■</span>	Implicit interaction network	$\beta > 1$

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