

How Colocation Shapes Communication: Evidence from a Hybrid Work Experiment

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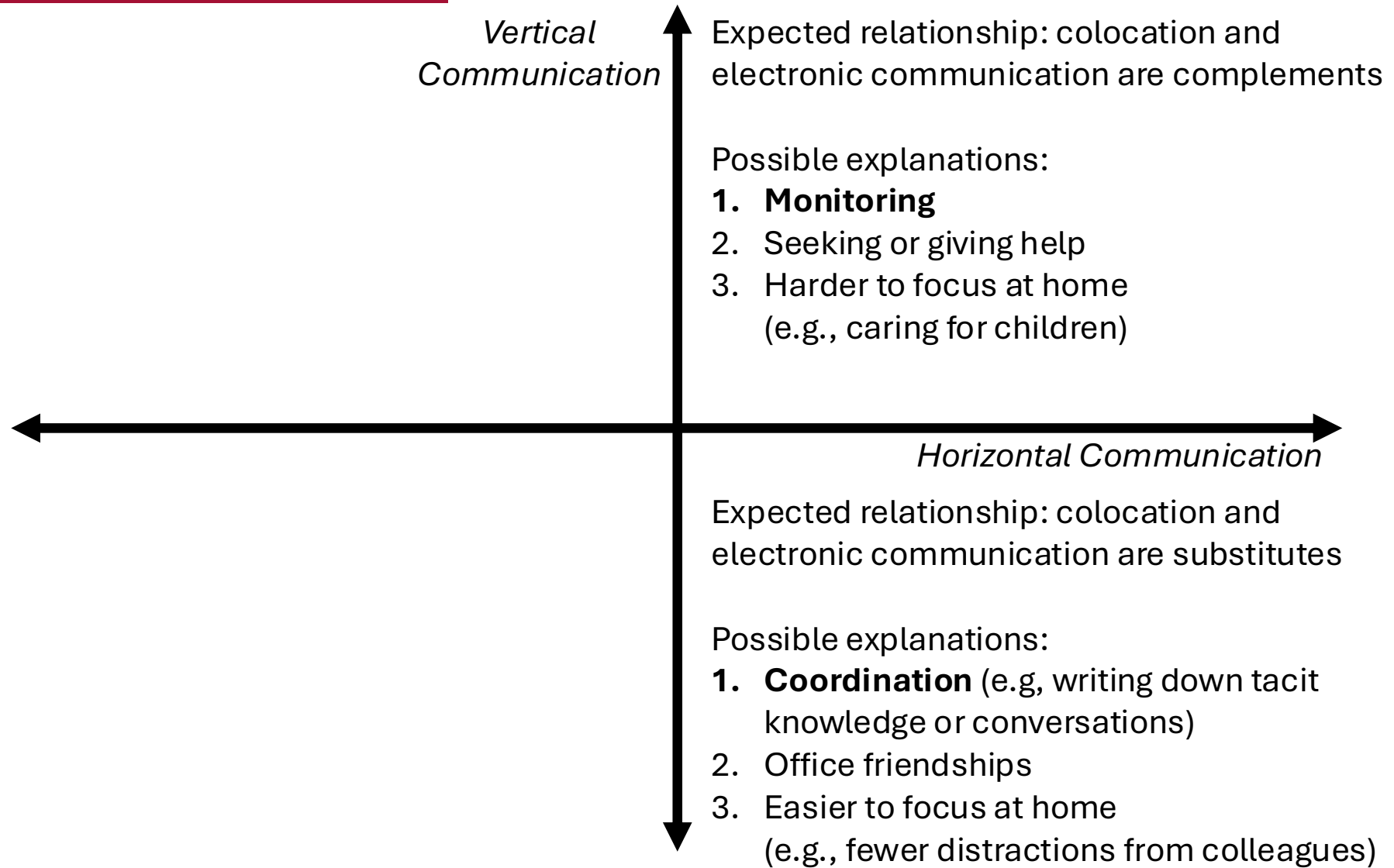
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How does the intensity of work-from-home affect intraorganizational communication along horizontal or vertical hierarchies?

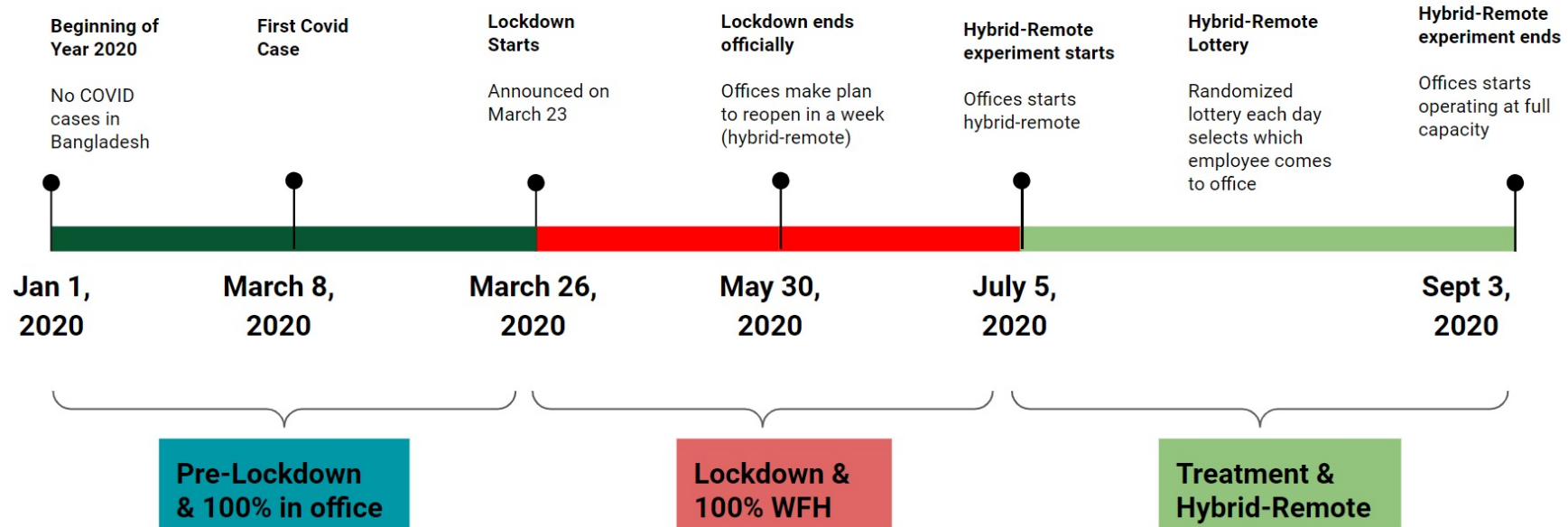
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- RTO mandates increasingly prevalent
- Potential rationales
 - Coordination tax: a lack of face-to-face interaction may hinder effective collaboration
 - Management-through-monitoring: managers may feel more comfortable in their abilities to accurately monitor employees face-to-face
- Compared to employees and managers being colocated:
 - Does email substitute for or complement coordination tasks?
 - Does email substitute for or complement monitoring tasks?

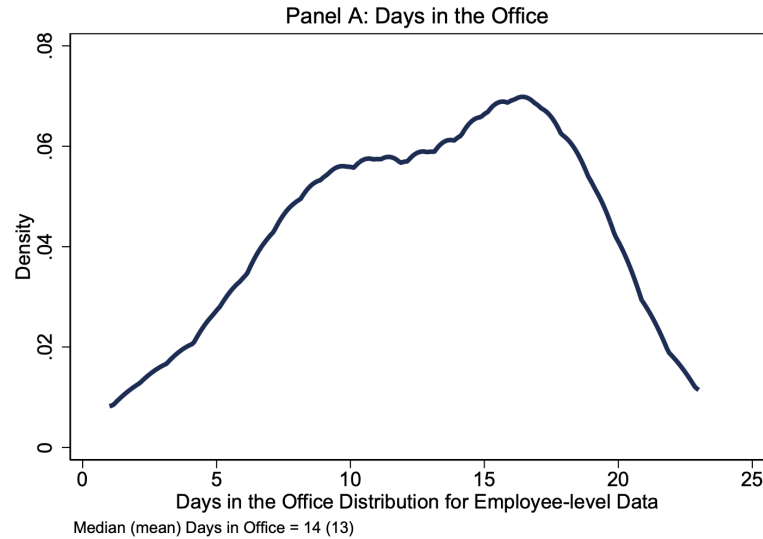
Potential Mechanisms



Experimental Timeline

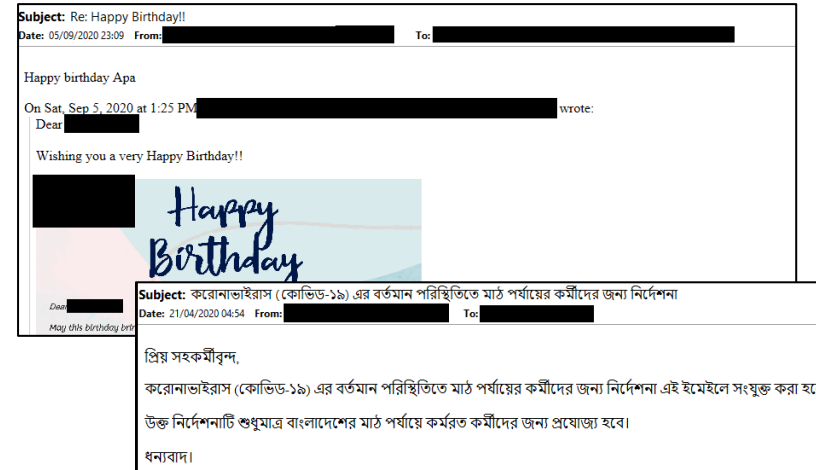


Data



Attendance, Demographic, and Survey Data

High WFH: < 9/35 workdays in office
Intermediate WFH: 9-14
Low WFH: > 14



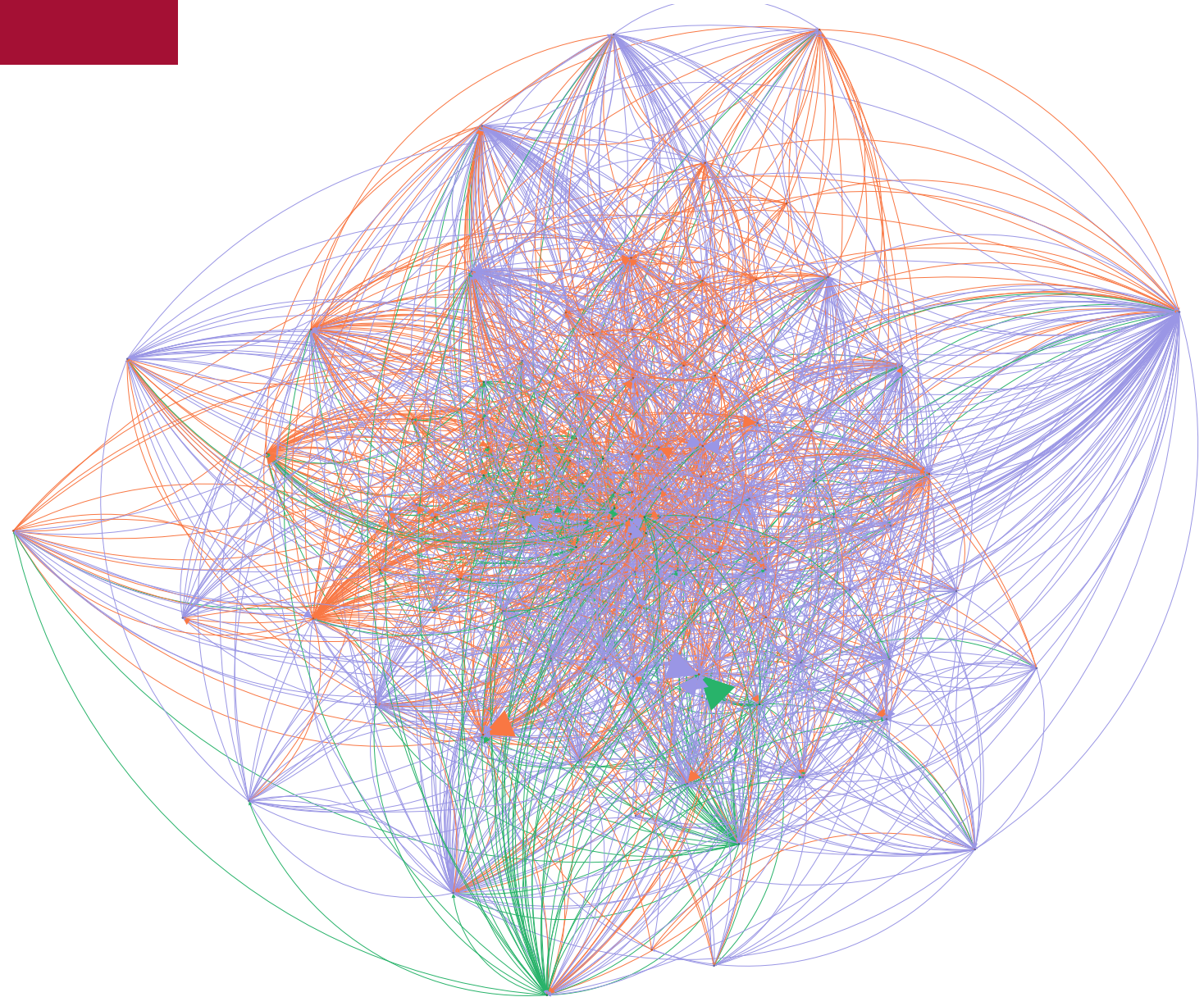
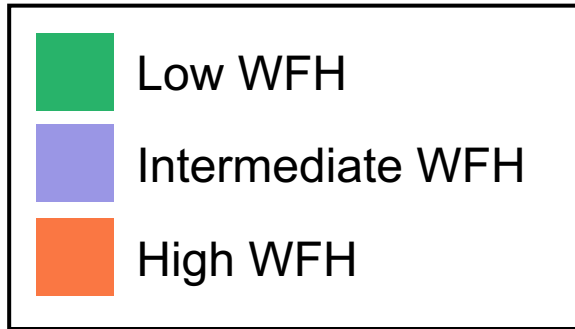
Employee Emails

from corporate HR workers, for control and treatment (experiment) periods

106 employees
32,745 emails
30,323 attachments

Network Topology

Sender



Four Categories of Email Communication

Coordination

- **Subject: CV_Position: Senior Manager, M&E Migration Programme (Contractual)** dear all, hope you are in good health. pfa the cvs of the candidates for tomorrow's interview. stay safe & thank you.
- **Subject: Re: Data Validation (Employee Mobile Number)** dear [recipient] just i want to know that all numbers are official numbers. please confirm. regards [sender]

Personal

- **Subject: Corona recovery** dear [recipient], hope having this mixture will help you to recover. get well soon! regards, [sender]

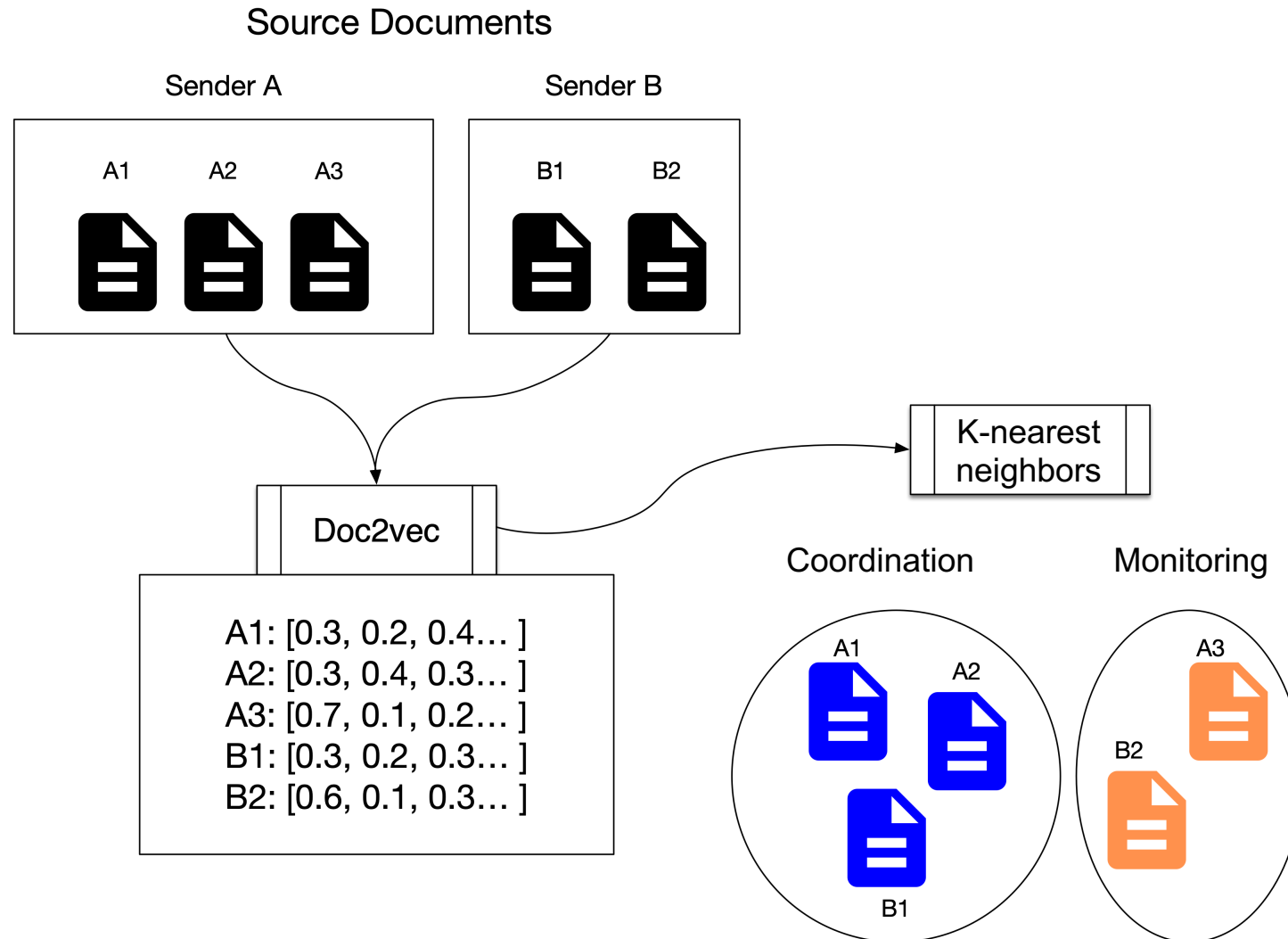
Monitoring

- **Subject: Ongoing Recruitment Status** dear [recipient], can you please explain why you haven't updated the ongoing recruitment file which we present to [name] daily? it has been reminded several times, i have also reminded yesterday evening during our daily meeting. your explanation on this will be appreciated. best, [sender]

Sending/Receiving Help or Knowledge

- **Subject: HRPP presentation PDF** dear [recipient], please find attached the pdf version of the presentation of hrpp orientation you participated on [date]
- **Subject: Fwd: [Duplication Check]Recruitment of [Position Name]** dear [recipient], please check the candidate on the list if duplicate found in the system. regards, [sender]

Email Classification



Email Volume and Length

- Little effect on total message volume, except between workers from different teams.
- When the sender and recipient are not colocated, emails are 12% longer.
- The largest effect is seen when managers email workers within their teams (+61%).

Dep. var. =	Total Messages (Poisson)							
	All	W-W (T)	W-W	W-M (T)	W-M	M-W (T)	M-W	M-M
No Colocation	.017 [.034]	-.045 [.041]	.083*** [.027]	.107 [.085]	.049 [.055]	.002 [.090]	.037 [.092]	.105 [.092]
Pseudo R-squared	.06	.02	.12	.19	.03	.08	.02	.17
Sample Size	6552	2094	2527	719	1050	650	904	458
Senders	106	86	90	57	90	15	16	16
Sender FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Receiver FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Date FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Dep. var. =	Words Per Message (Poisson)							
	All	W-W (T)	W-W	W-M (T)	W-M	M-W (T)	M-W	M-M
No Colocation	.117** [.056]	.271*** [.076]	.033 [.100]	.018 [.213]	.025 [.083]	.611** [.248]	.056 [.045]	.479** [.203]
Pseudo R-squared	.93	.57	.58	.93	.56	.52	.95	.97
Sample Size	6552	2094	2527	719	1050	650	904	458
Senders	106	86	90	57	90	15	16	16
Sender FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Receiver FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Date FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

“W” means worker (“M”, manager), W-M means sent from a worker to a manager, and the (T) suffix means within the same team.

Email Volume and Length

- Within these dyad types, effects present across all combinations

Dep. var. =	Words Per Message (Poisson)							
	All	W-W (T)	W-W	W-M (T)	W-M	M-W (T)	M-W	M-M
Both WFH	.101 [.088]	.286*** [.098]	-.010 [.105]	.056 [.235]	.013 [.107]	.657*** [.228]	.000 [.151]	.571*** [.201]
Sender WFH Receiver Office	.060 [.083]	.299*** [.113]	-.084 [.114]	-.060 [.195]	.037 [.102]	.804*** [.303]	-.033 [.138]	.401* [.214]
Sender Office Receiver WFH	.145*** [.045]	.249*** [.068]	.127 [.094]	.076 [.220]	.023 [.067]	.312* [.169]	.059 [.049]	.521** [.209]
Pseudo R-squared	.93	.57	.58	.93	.56	.53	.95	.97
Sample Size	6552	2094	2527	719	1050	650	904	458
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Date FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

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- Non-colocation:
 - **Increases** the share of emails related to **coordination**
 - +6.6 percentage points overall
 - +12.4 percentage points for worker-worker dyads in the same team
 - **Decreases** the share of managers' emails related to **monitoring employees**
 - Negative but not significant for manager-worker dyads
 - -1.7 percentage points for worker-worker dyads in the same team
 - -4.8 percentage points for worker-manager dyads across teams

Non-colocation: Intensive Margin

Dep. var. =	Fraction Coordination Email (OLS)							
	All	W-W (T)	W-W	W-M (T)	W-M	M-W (T)	M-W	M-M
Non-colocation	.066**	.124***	.012	-.031	.011	.007	.071	-.025
	[.028]	[.035]	[.034]	[.059]	[.041]	[.075]	[.064]	[.072]
Within R-squared	.00	.01	.00	.00	.00	.00	.00	.00
Sample Size	6552	2094	2527	719	1050	650	904	458
Senders	106	86	90	57	90	15	16	16
Sender FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Receiver FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Date FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Dep. var. =	Fraction Monitoring Email (OLS)							
	All	W-W (T)	W-W	W-M (T)	W-M	M-W (T)	M-W	M-M
Non-colocation	-.007	-.017*	-.002	.043**	-.048**	-.014	-.019	.076***
	[.007]	[.010]	[.011]	[.018]	[.019]	[.033]	[.034]	[.024]
Within R-squared	.00	.00	.00	.01	.01	.00	.00	.02
Sample Size	6552	2094	2527	719	1050	650	904	458
Senders	106	86	90	57	90	15	16	16
Sender FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Receiver FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Date FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

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Three Measures of Information

- The Production Perspective: Novelty
 - *How diverse is the information an individual produces?*
- The Consumption Perspective: Information Uniqueness
 - *How useful and unique do recipients find the information an individual sends them?*
- Pure Uniqueness
 - *How many purely unique work products (e.g., a PDF) are sent by an individual?*

Three Measures of Information

	(1)		(2)	
	Panel D.V.	S.E.	Panel D.V.	S.E.
<i>Panel A: Change in Information Novelty</i>				
Intermediate WFH	0.385	(0.210)	0.565	(0.248)
Low WFH	0.150	(0.236)	0.224	(0.260)
Non-Manager			-0.758	(0.264)
Male			0.222	(0.183)
<i>Panel B: Change in Information Uniqueness</i>				
Intermediate WFH	0.423	(0.176)	0.517	(0.176)
Low WFH	-0.461	(0.395)	-0.239	(0.384)
Non-Manager			-0.163	(0.200)
Male			-0.335	(0.169)
<i>Panel C: Change in Novel Email Attachments</i>				
Intermediate WFH	0.172	(0.160)	0.319	(0.159)
Low WFH	0.187	(0.226)	0.322	(0.227)
Non-Manager			-0.630	(0.216)
Male			0.283	(0.151)
Other Demographic Controls	No		Yes	
Observations	105		99	

Limitations

- Nine-week sample period, unclear if effects persist
- Only email communication was observed
 - Video meetings not widespread, but missing in-person/phone conversations and WhatsApp messages
- Need to control for prior exposure between dyad members
 - Early results suggest that prior exposure reduces the volume of coordination, perhaps due to trust or tacit knowledge
- In practice, WFH schedules not randomized at the individual level (e.g., specific teams might choose to be in the office together Monday-Wednesday, with flexibility on other days)

Takeaways

- Colocation is a substitute for horizontal, coordination-related communication, but a complement to vertical, monitoring-related communication
- Workers within the same team allocate more time to coordination-related communication
- Individuals emerge as knowledge brokers when working from home 2-3 days per week
 - Send more distinctive and non-overlapping information

Thank You!

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