

The Social Effects of *Keitai* and Personal Computer E-mail in Japan¹

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Japanese often use *keitai* (Internet-enabled mobile phones) to communicate with their close friends and family. The small size and portability of the *keitai* makes it possible to send messages at almost any time and in any place – even Tokyo subway lines have been wired to enable connection underground. Moreover, the ability to type discrete messages makes it socially conducive to send messages quietly in public places where voiced conversation would be socially unacceptable. As in other countries, the heaviest users of this technology are young people, who often text message each other as a way to nurture relationships that might otherwise be hampered by parents and other authority figures. The kinds of text messages sent by *keitai* vary considerably, from the utility oriented *keitai* e-mail that is used to co-ordinate in-person meetings, to the seemingly superfluous “I’m so bored” e-mail that promotes a sense of “ultra-connectedness” between lovers and confidants (Ito 2001).

While these studies have gone a long way towards understanding the *keitai* phenomena, a number of unanswered questions remain about the long term social implications of this technology. First, although it has been well documented that *keitai* use increases contact with close friends and family, it is unknown if it is used to develop new supportive relationships. It is possible that *keitai* communication only supports existing supportive relationships, but does not help develop new relationships. Second, it is not known if *keitai* e-mail has the potential to replace PC e-mail over time. While it is possible that both types of e-mail will be used together to contact supportive ties, the convenience and portability of the *keitai* might make PC e-mail redundant.

This chapter addresses these questions using longitudinal data collected in Japan’s Yamanashi prefecture. Conducted over three years, this is one of the first studies to collect information over time about social networks and e-mail. As such, it offers a unique opportunity to map out the adoption of *keitai* and how its use is associated with changes in relationships. In this paper, we will address two research questions:

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Is keitai used to form new relationships that provide important kinds of social support?

Are keitai and PC e-mail used together as a single communication system to contact and form supportive relationships, or do they play different roles in developing and maintaining social networks?

After addressing these questions, we discuss their implications for the substantial percent of young people that use *keitai* as their only means of accessing e-mail.

Locating E-Mail Use in Japan

Japan is a useful location for studying the social implications of mobile *and* PC e-mail. In the section that follows, we draw on two highly regarded reports sponsored by the Japanese government (Ministry of Public Management 2004, 2005) to provide statistics about PC and *keitai* internet use in Japan.

Advanced mobile usage is popular in Japan: 86 percent of mobile phone users have a browser phone, 74 percent have a camera phone, and 30 percent use a combination of cutting edge technologies called “IMT-2000.” Although mobile service started with mere voice service, the diversification and advancement of mobile service is becoming significant with each passing year. In 1999, the first browser phone service was launched, and in 2000 the camera phone appeared on the market. In 2001, commercial IMT-2000 service started and currently there are more than 25 million subscribers. Now that *keitai* is a multifunction terminal, which can be used to exchange pictures, record videos, play online games, watch TV, and carry out financial transactions.

Japan is also among the world’s leaders in PC based high-speed internet usage. It has the second highest penetration of high-speed connections in the world, trailing only behind the United States. It also has one of the least expensive connections in the world. The number of internet users at the end of 2004 was estimated to be 79.48 million with a penetration rate of 62 percent. The percentage of broadband households (using FTTH, DSL, cable internet or wireless access) to the total households accessing the internet via home PCs was 62 percent at the end of 2004. Since the penetration rate exceeded 60 percent at the end of 2003, the rate of adoption is beginning to plateau, as it has in the US.

In Japan, the internet is most commonly accessed by both PCs and *keitai*. 52 percent of internet users access the internet by *both* PC and *keitai*, 26 percent use only a PC, and 19 percent use only *keitai*. Hence, in this chapter, we focus on the internet access by PC and mobile phone, and reveal the consequences of using these different types of access.

Rather than looking at all internet activities conducted through *keitai* and PCs, our analysis focuses on the use of e-mail. Although people can use various services by accessing the internet from PCs and *keitai*, the most common use of the internet is e-mail. 57 percent of internet users access their e-mail from their home PCs. 57 percent use home PCs to search for information on goods and services, 48 percent obtain news and other information, and 36 percent purchase goods and services. As with PCs, e-mail is the most common activity when using *keitai*. 74 percent of *keitai* users send and receive e-mail using their *keitai*. 50 percent use *keitai* to download and listen to online music, 32 percent use it to download images, and 26 percent to it obtain news and other information.

Can *Keitai* Use Help Develop New Supportive Relationships?

Does the additional quantity of contact facilitated by *keitai* help people develop new supportive relationships? Although cross-sectional studies have shown that *keitai* use is associated with having supportive ties, it is not presently known if this technology is useful for developing new supportive ties. It is quite possible that *keitai* users just use the *keitai* to communicate more often with their existing supportive relationships. Thus, their adoption and use of the technology only reinforces their existing relationships, without actually helping to develop new supportive relationships. Without charting the longer term uses of *keitai*, it is impossible to know if this increased communication is helpful in developing new ties that provide support.

This paper examines three dimensions of supportive ties: emotional, financial, and instrumental. Emotional support helps people cope with daily stresses, as well as more serious problems such as illness. A number of psychological studies show that having emotionally fulfilling relationships with friends and family generally improves people's access to other kinds of social support, their sense of meaning in life, their self-esteem, and their commitment to social norms and to their communities (e.g., Cohen & Wills 1985; Thoits 1983). Financial support can also be important for coping with stressful situations, such as the loss of a job. Moreover, it may enable people to improve their quality of life by helping buy property or start a small business. Finally, instrumental support is the provision of help needed to do certain activities. This kind of help includes the common activities such as taking care of a child for a short period of time while a parent visits the grocery store. However, it might include the less common task of cooking for someone who is ill. In general, these three kinds of support lead to greater levels of overall psychological and physical well-being.

Media Multiplexity or A Division of Media?

Lacking longitudinal context also limits the knowledge that can be gathered about the potential multiplexity that occurs between *keitai* e-mail and PC e-mail over time. On the one hand, both *keitai* and PC e-mail may be used to foster relationships with supportive ties. Research conducted in North America shows that people contact their ties using a wide array of communication media (Haythornthwaite & Wellman 1998). This "media multiplexity" means that people take advantage of the multiple affordances provided by

specific media. Contrary to fears that e-mail would reduce other forms of contact, it has been found that high levels of e-mail contact are associated with high levels of landline and mobile phone use (Boase et al. 2006). Moreover, research has shown that the links between different communication media are complexly interwoven: visits drive e-mail, and phone calls drive visits, but e-mail typically drives neither phone calls nor visits (Shklovski, Kraut, and Raine 2004; Carrasco et al. 2008).

On the other hand, people in Japan may reserve *keitai* e-mail exclusively to foster relationships with supportive ties. Unlike in North America, Japanese people send heavy amounts of e-mail by *keitai* phones. Among this population, e-mail sent by *keitai* phones might make PC e-mail redundant for contact with supportive ties. Although PC e-mail is similar to *keitai* e-mail in many ways, *keitai* e-mail has several features, or social affordances, that make it especially useful for maintaining supportive ties. There are a number of ways that *keitai* allows people to maintain frequent contact, which most often occurs with supportive ties. The discrete nature of communication allows contact to occur in many venues where face-to-face or vocal phone communication would not be socially acceptable. Moreover, the mobility of these phones makes it possible to carry out this communication in places that are visited during everyday activities, the most prominent example being during the commute between work and home. The use of emoticons enhances the possibility for emotionally expressive communication, where the message is based more on emotion than on instrumental content. While much of this frequent contact may be expressive, *keitai* phones are also used to coordinate social meeting times and places, allowing them to serve instrumental functions in these close relationships as well. These affordances make *keitai* e-mail a convenient way to keep in constant connection with supportive ties.

Although the advantages of sending e-mail by *keitai* might make PC e-mail redundant for contacting supportive ties, it is unlikely that *keitai* e-mail has the potential to replace the social function of PC e-mail completely. In contrast to *keitai*, e-mail sent by PCs might be best utilized to maintain contact with diverse social circles. These diverse ties may not be as strong as supportive ties that provide emotional, financial, or instrumental social support. However, their diversity makes them valuable sources of information. The more different types of people you know, the more social milieus you are likely to be connected with (Feld 1981). Accessing information from diverse social milieus can be useful when making important life decisions, such as deciding how to invest money, or where to apply for a job (Granovetter 1973, 1983). Moreover, the new ideas that these ties provide might open people to new ways of understanding the social world, helping them make informed political decisions (Côté & Erickson forthcoming; Ikeda & Richey 2005).

Both *keitai* and PC e-mail share a number of features that might be useful for staying in touch with diverse ties. However, PC e-mail provides one social affordance that makes it far more conducive for contacting diverse ties than *keitai* e-mail: the ability

to quickly type long and involved messages. Because *keitai* messages are often limited in their length and can only be thumbed in at a slow pace, they require that the receiver have a great deal of prior knowledge about the sender. By contrast, PC messages can be much more detailed, explaining the purpose of the message, making explicit the large amount of information required to make a meaningful interpretation of a message when little is known about the sender. PC e-mail also has a number of additional features that are common to those of *keitai* and make it useful for keeping in contact with diverse ties. People can contact many diverse people, with a great amount of control over the time that they spend making these contacts, and without concern that they will interrupt these people. Moreover, the lack of visual cues decreases the time and effort needed to change demeanor and appearance when making contact with those from a different social economic status. Hence, there may be a division of e-mail, where *keitai* becomes the dominant way of maintaining and nurturing supportive ties, while PC e-mail is best utilized to maintain contact with diverse social ties.

Data and Measures

To explore these research questions, we analyzed longitudinal survey data. We conducted a panel survey in Japan. Our first random sample survey of 1,320 adults was conducted in November 2002 in Yamanashi prefecture. Yamanashi prefecture includes areas ranging from urban to rural, and it is similar to Japan overall in its distributions of internet use, civic engagement, and political activity. These potential respondents were chosen from a voter's list of people aged 20-65 years old. Surveys were in paper form and delivered in-person. They were also collected in-person three weeks after being dropped off. Three-quarters (75 percent) of the selected individuals completed the survey, giving us a total sample size of 1002 respondents at Time 1. Of these respondents, 646 were interviewed in March 2004 at Time 2. In March 2005, 432 of the original 1002 respondents completed a second survey at Time 3. Our analysis focuses on the 432 respondents that completed surveys at Time 1 and Time 3.

Between Time 1 and Time 3 there was a decrease in the number of younger respondents, especially those in their 20s. Younger respondents tended to refuse participation at Time 3 or had moved. There were also significant changes in marital status between Time 1 and Time 3. There were fewer single people in Time 3, but more people with a partner and a child living together or with a partner and a child living apart. The percent of single adults dropped from about 24 percent in Time 1 to 14 percent in Time 3. Here as well, it may have been that the percent of single adults dropped because the percentage of young people dropped between Time 1 and 3.

Table 1: Amount of Keitai and PC e-mail sent “yesterday” at Time 1 and Time 3

	Time 1		Time 3	
	Keitai email	PC email	Keitai email	Pc email
Do not have	56	56	45	51
Do not use	2	13	3	14
Did use not send email yesterday	16	22	17	27
1-5 emails	21	8	32	7
6-10 emails	4	1	2	0
11-25 emails	0	0	1	0
26-50 emails	0	0	0	0
More than 51 emails	0	0	0	0
	100%	100%	100%	100%

Quantifying E-Mail Use

Unlike cross-sectional surveys, the Yamanashi study allows us to measure fluctuations in the quantity of e-mail sent between two points in time. With this information, we are able to understand if changes in the quantity of *keitai* and PC e-mail sent are associated with changes in the formation of supportive and diverse ties. We begin our analysis by describing these changes for the people in our sample as they occur at Time 1 and Time 3.

To quantify e-mail use, respondents in both Times 1 and 3 were asked about the number of e-mails they sent yesterday by mobile phone and PC. A six point scale was used to record their responses: 1) I do not send e-mails by mobile phone/PC; 2) I sent 1 to 5 e-mails; 3) 6 to 10 e-mails; 4) 11 to 25 e-mails; 5) 26 to 50 e-mails; and 6) More than 51 e-mails. See Table 1 for a summary of the percent of respondents sending *keitai* and PC e-mail at Time 1 and Time 3.

Given the small percentage of respondents sending *keitai* and PC e-mail at Times 1 and Times 3, we decided to collapse the last 5 categories of these variables when using these variables in our analysis. The final categories for *keitai* and PC e-mail use are as follows: 0) do not have; 1) have, but did not send any e-mail yesterday; 2) have, and sent e-mail yesterday.

To show the degree of change in *keitai* and PC use between Time 1 and Time 3, we code *keitai* and PC e-mail use as remaining stable if the level of use did not change, increasing if there was a positive change, and decreasing if these was a negative change. We find that approximately 68 percent of the respondents have stable levels of *keitai* e-mail, while 22 percent have increasing levels, and 10 percent have decreasing levels. We also find that approximately 72 percent of the respondents have stable levels of PC e-mail, while 15 percent have increasing levels, and 13 percent have decreasing levels.

Measuring Supportive and Diverse Ties

Supportive Ties. We focus on three dimensions of support: emotional, financial, and instrumental. Respondents were asked to report whether network members would give them words of encouragement (emotional support), treat them to lunch if they did not have enough money (financial support), or aid them in tasks such as moving (instrumental support). In Time 1, approximately 82 percent of the respondents said that they could receive all three kinds of social support, while 18 percent could receive only two kinds of support or fewer. In Time 3, approximately 81 percent of the respondents received all three kinds of social support from their ties, while 19 percent received only two kinds of support or fewer. In the analysis that follows, we will make the reception of social support into a dichotomous variable. Respondents with a score of 1 have all three kinds of support, while respondents with a score of 0 do not receive all three kinds of support.

Network Diversity. Network diversity has many different facets, such as occupational diversity, gender diversity, ethnic diversity, etc. We focus on occupational diversity because people who work in different occupations often come from different social backgrounds (Lin 2001). Respondents were asked to indicate if they have any relatives, friends, or acquaintances in any of 15 categories of diverse occupations. A count of the number of different occupation categories was made for each respondent, yielding a score from 0 to 15, with a higher score indicating greater diversity of contact.

In addition to these two types of social networks, we control for network size. Social network size was measured by asking respondents how many personal New Year's greeting cards they had sent that year. This yielded a proxy measure of total size of networks, including supportive and diverse ties.

The Impact of E-Mail on the Formation of Supportive Ties

Does increasing the quantity of *keitai* e-mail help people develop supportive ties? We examined this research question using logistic regression analysis with our longitudinal data. Model 1 in Table 2 shows the result of our analysis.

The dependent variable is the provision of all three kinds of support from social ties at Time 3, and the main independent variable is the change in frequency of *keitai* e-mails from Time 1 to Time 3. We control for demographic factors: gender, age, education, occupation, and marital status. Moreover, we control for voluntary activity and other network characteristics at Time 3, as they may be associated with the presence of supportive ties at Time 3.

The results show that changes in the frequency of sending *keitai* e-mail has no effect on increasing the variety of support available from ties at Time 3. This indicates

that *keitai* is not used to develop relationships supportive relationships that yield new kinds of support.

Although we do not find a significant association between increasing levels of *keitai* e-mail and the development of supportive ties, this does not mean that *keitai* e-mail is not used to contact these ties. Our previous cross-sectional analysis of Time 1 shows a significant and positive association between the amounts of *keitai* e-mail sent at one point in time and the reception of social support (Miyata et al. 2005). This indicates that *keitai* is just one communication medium that supports existing supportive relationships, although our results presented here show that it is not used to develop new supportive relationships.

Table 2: Logistic Regression - People who received all three kinds of supportive ties at Time 3

	Model 1			Model 2		
	B	Wald	Exp(B)	B	Wald	Exp(B)
Gender (0 = female, 1 = male)	0.143	0.144	1.154	0.166	0.192	1.180
Age (reference = 20-29)						
30-39	-0.679	0.654	0.507	-0.763	0.838	0.466
40-49	-1.070	1.540	0.343	-1.043	1.462	0.352
50-59	-0.767	0.842	0.464	-0.818	0.935	0.441
60-65	-0.632	0.482	0.532	-0.685	0.551	0.504
Education (reference = Middle school)						
High-school	-0.813	1.180	0.444	-0.790	1.107	0.454
College	-0.578	0.516	0.561	-0.571	0.503	0.565
Undergraduate degree or more	-1.668	4.311 *	0.189	-1.708	4.457 *	0.181
Employment Status (0=no job,1=have a job)	-0.079	0.040	0.924	0.000	0.000	1.000
Partner (0= no, 1= yes)	-0.940	1.888	0.391	-0.871	1.637	0.419
Kids living together (0= no, 1= yes)	0.523	1.574	1.687	0.512	1.519	1.668
Number of groups participated in(T3)	0.279	0.802	1.321	0.227	0.546	1.255
Diversity of social networks (T3)	0.126	3.214	1.135	0.109	2.451	1.115
Size of social network(T3)	0.257	2.385	1.293	0.250	2.358	1.284
Presence of 3 kinds of support (T1) (ref = less than 3 kinds of support)	1.412	14.635 **	4.104	1.420	14.866 **	4.138
Change in the use of Keitai email (T3-T1)(reference=stable)						
More Use	-0.306	0.653	0.736			
Less Use	0.951	1.935	2.588			
Change in the use of PC email (T3-T1)(reference=stable)						
More Use				0.078	0.029	1.081
Less Use				0.053	0.013	1.054
Constant	0.800	0.550	2.225	0.868	0.648	2.383
Cox & Snell R2	0.111			0.102		
Nagelkeke R2	0.186			0.171		

* p < 0.05

** p < 0.01

N = 432

Media Multiplexity or Division of Media

Although *keitai* e-mail is used to contact existing supportive relationships, we have shown that *keitai* use is not useful in forming new supportive relationships. However, we do not know if PC e-mail can be used to develop new supportive relationships. It may be that the ability to enter long and involved messages makes PC e-mail more useful for developing new supportive relationships. On the other hand, it may be that these two media are used to contact different components of the social network.

To better understand the social uses of these media, we again use logistic regression with our longitudinal data. We start by using changes in PC e-mail use between Time 1 and Time 3 as our main independent variable, and again use the provision of all three kinds of social support at Time 3 as our dependent variable. As in the previous analysis, we control for demographics, participation in voluntary groups, and other social network attributes. The results of this analysis are presented in Table 5, Model 2.

As with *keitai* e-mail, these results show that there also is no significant relationship between increasing the level of PC e-mail use and having new supportive relationships at Time 3. This suggests that PC e-mail is not used to develop new supportive relationships.

Does this mean that PC e-mail is redundant? We suspect that while *keitai* e-mail may be important for contacting existing supportive ties, PC e-mail may be important for contacting and forming diverse ties. Our previous cross-sectional analysis already shows there is a significant and positive relationship between PC e-mail and diversity of ties at Time 1 (Miyata et al. 2005). This is evidence that PC e-mail is used to contact diverse ties. But is PC e-mail also used to develop new diverse ties?

To measure the effect of PC e-mail on increasing the diversity of ties, we use change in level of PC e-mail from Time 1 to Time 3 as our main independent variable, and network diversity at Time 3 as our dependent variable. We control for demographic and network attributes. Levels of voluntary group participation are also controlled for because Erickson & Miyata (2004) found that participation in informal groups enhances the diversity of social ties. See Model 1 and Model 2 in Table 3 for results.

As shown in Model 1, increasing levels of PC e-mail between Time 1 and Time 3 is associated with greater network diversity at Time 3. By contrast, Model 2 shows that increasing amounts of e-mail sent by *keitai* is not associated with increases in network diversity. This shows that increasing the amount of PC e-mail can cause an increase in diversity of networks, while increasing the amount of *keitai* e-mail does not cause such a change.

These results show that *keitai* and PC e-mail each serve different social functions. Unlike media use in North America where most people use all available media to contact their social ties, there is a division of media in Japan. *Keitai* e-mail is used to contact existing *supportive* ties, while PC e-mail is used to contact existing diverse ties and to form new diverse ties. Both of these media are important. Quality ties improve mental well being, diverse ties provide information that can be helpful when making important decisions.

Table 3: Regression Analysis - Diversity of Ties at Time 3

	Model 1		Model 2	
	B	Beta	B	Beta
Gender (0 = female, 1 = male)	-0.097	-0.017	-0.018	-0.003
Age (reference = 20-29)				
30-39	0.088	0.012	0.148	0.020
40-49	0.293	0.045	0.421	0.064
50-59	0.179	0.030	0.209	0.035
60 -65	-0.369	-0.047	-0.407	-0.052
Education (reference = Middle school)				
High-school	0.122	0.022	0.169	0.030
College	0.044	0.007	0.076	0.012
Undergraduate degree or more	0.101	0.015	0.134	0.020
Employment Status (0=no job,1=have a job)	0.335	0.054	0.370	0.060
Partner (0= no, 1= yes)	1.060	0.142	1.174	0.158 *
Kids living together (0= no, 1= yes)	-0.905	-0.159 *	-0.974	-0.171 **
Number of groups participated in(T3)	0.420	0.090	0.427	0.092
Diversity of social networks (T1)	0.518	0.550 **	0.520	0.552 **
Size of social network(T3)	0.098	0.041	0.071	0.030
Presence of 3 kinds of support (T3) (ref = less than 3 kinds of support)	0.787	0.105 *	0.843	0.113 *
Change in the use of PC email (T3-T1)(reference=stable)				
More Use	0.757	0.098 *		
Less Use	-0.393	-0.050		
Change in the use of Keitai email (T3-T1)(reference=stable)				
More Use			0.142	0.021
Less Use			-0.315	-0.034
Constant	-0.491		-0.593	
R2	0.433		0.421	
Adjusted R2	0.403		0.391	

Implications for the Future

These findings cause us to wonder what will happen to the large percent of young people that use *keitai* as their only means of accessing e-mail. Even though *keitai* is more effective for nurturing existing supportive ties than the PC, we show that it is not as effective as the PC when it comes to forming diverse ties. This means that, compared to with those that have both *keitai* and PC e-mail, the large percentage of young people that only use *keitai* are disadvantaged when it comes to forming diverse relationships.

Will the *keitai* only users of this young generation remain dependent on the *keitai* as they grow older? It is too early to know for sure, but there is some reason to believe that this scenario might become reality. Although it was only a relatively short period of time, 28 percent of our respondents in their 20s relied on *keitai* as their only means of sending e-mail throughout the three years that the Yamanashi study took place. By contrast, 42 percent of people in their 20s continued to use both PC and *keitai* e-mail throughout this three year period. Finally, 14 percent went from only *keitai* e-mail to having both PC and *keitai* e-mail after three years. Although it is encouraging to see 14 percent of these young people gain both media, we are still concerned about the 28 percent that continued to rely only on *keitai* e-mail. Even though this relatively short duration of time and small sample of young people make it difficult to make any certain projections about the future, these preliminary results give some indication that this digital divide may continue as the younger generation matures.

A continual dependence on *keitai* means that supportive ties will remain at the center of social life for a substantial percentage of the population. We have several concerns about this scenario. First, a lack of diverse ties might put this generation at an economic disadvantage, because diverse ties often supply new information that can be useful for important life decisions. Moreover, because diverse ties are with people of different backgrounds, they provide exposure to new ideas and ways of understanding the world. For this reason, we also fear that a *keitai* dependent generation would lead insular lives, remaining ignorant of how people from social strata live and interpret the world.

Conclusion

Although *keitai* e-mail is a useful tool for connecting to existing supportive relationships, we find *keitai* e-mail is not used to form new supportive relationships. By contrast, PC e-mail can be instrumental in forming new relationships with people from diverse social strata. These findings indicate that there is a division of media in Japan, with *keitai* and PC e-mail serving different social functions. *Keitai* e-mail is used to contact supportive relationships, while PC e-mail helps people expand and diversify their networks.

Because both supportive and diverse ties help people improve their lives in different ways, we argue that people using both media are most advantaged. Although they do not use *keitai* e-mail to form new relationships, they still have more contact with ties that provide emotional, instrumental, and financial support, than those that do not use *keitai* e-mail. Moreover, people that use PC e-mail are able to cultivate relationships that provide valuable ideas and information. For these reasons, we expect that people using both media will be better able to improve their lives.

These results have important implications for the substantial percent of young people that rely on the *keitai* as their only means of accessing e-mail. If our preliminary results are indicative of a larger social trend, this generation may be overly focused on

their supportive relationships, at the expense of diverse relationships. Because diverse relationships often expose people to new sets of knowledge, information, and ways of understanding the world, this group of young people may hold attitudes that are myopic and based on ignorance rather than informed deliberation. Further research is needed to see if these speculations hold true when they are examined using a larger sample of young people. However, given that our observations are indicative existing inequalities, we suspect that our evidence foreshadows an unfortunate reality.

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