



We then up and down sampled each group for each celeb to be approximately of the same size. This left us with a set of 57,609 fans.

For all the users, we used Face++ Api<sup>2</sup> on their profile pictures to obtain estimates of their age and gender. Face++ uses computer vision and data mining techniques applied to a large database of celebrities to generate estimates of age and sex of individuals from their pictures. We were able to obtain confident age and gender predictions for around 50% of the users (27,889 users).

## PARA-SOCIAL BREAKUPS

In this section, we try to understand how different types of fans engage in para-social breakups. We assume that a para-social breakup on Twitter manifests itself as an act of unfollowing the celebrity. We tracked all the 57k fans for a period of 26 weeks (between 21 May 2015 – 21 Nov 2015), and got data on whether they still follow the celebrity every week. At the end of the data collection period, we recorded 2,369 fans unfollowing a celebrity during this period. We also estimate when the fans started following the celebrity using the method proposed by Meeder et al [5].

We model unfollowing behavior using Survival analysis. Survival analysis is a statistical tool for analyzing the expected time to an event (unfollowing, in this case). It can be used to answer questions such as: whether a group of fans is more likely to unfollow than others. We set up survival analysis as follows: (i) *Event*: The act of unfollowing a celeb, (ii) *Survival time/event time*: Months since following the celebrity to unfollow. e.g. if a fan follows a celeb in Jan 2015 and unfollows in Oct 2015, this variable is 10. We have data going back to the last 4 years (48 months). (iii) *Censoring event*: All users who haven't unfollowed yet. For example, if a user followed the celebrity in Jan 2015 and is still following, we censor the user after 27 months (Jan 2015 to Apr 2017) (iv) *Survival function*: Probability of unfollowing after  $x$  months.

Given this set up, our first task is to see if there is any difference in para-social breakups between the three fan types (involved, casual and random). Figure 1 shows the survival probability for the various fan types using a Kaplan Meier non-parametric analysis. Compared across groups, involved users have a statistically significantly higher probability of unfollowing. We can also see that the chance of unfollowing for random users is almost non-existent.

This finding might be counter intuitive, given we expect involved fans to feel “closer” to the celebrity. We can interpret this behavior in terms of a cost/benefit analysis. The more a fan engages the celeb, the more likely it is for the relationship to end. The more involved a fan is the more the emotional cost they invest in the relationship and thus the more likely they are to end it when it does not reward them.

We also looked at a para-social breakup using the demographics of the fans, inferred from Face++. We found that young and female fans tend to be high investors in engaging with the celebrity, whereas as older fans are less invested and less prone to disappointment and breakup (details omitted due to lack of space).

We manually looked at the profile descriptions of users who unfollowed, before and after unfollowing, and found interesting examples. (i) Before: ‘@arianagrande followed and faved (30.11.14)’,

<sup>2</sup><http://www.faceplusplus.com/>

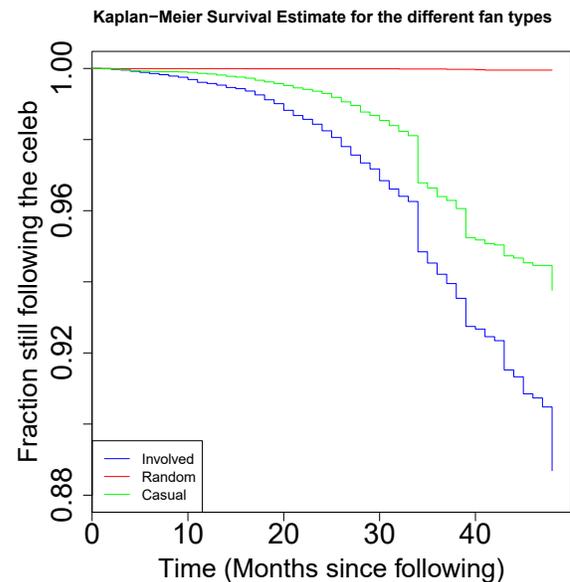


Figure 1: Survival probability for the three fan types

After: ‘dreams dont work unless you do. good vibesss!!’ (ii) Before: ‘thank you justin my life’, After: ‘find your purpose’ (iii) Before: ‘queen faved x2. pls follow 2, ma queen’, After: ‘im loving the pain, i never wana live without it’. These examples show cases of despair and a sense of defiance after not getting the personal attention they desired.

In summary, our analyses point to the complexity that social media use adds to fandom behavior and the various ways different fans engage in para-social breakups. As celebrities - and now presidents - continue to use social media as a central avenue to cultivate their following, engage their fans and influence society, it is worthwhile to study the ways such relationships are developed, maintained and dissolved.

## ACKNOWLEDGEMENTS.

This work has been partly supported by the Academy of Finland project “Nestor” (286211) and the EC H2020 RIA project “SoBigData” (654024).

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