"Working towards CRM Nirvana: getting the right content to the right customers at the right time in a format they prefer."

Mike Migliore,
Head of Customer Value,
The Times and
The Sunday Times

JAMES

Your Digital Butler

Driving Net Subscription Growth using AI and ML

White Paper

THE TIMES
THE SUNDAY TIMES
Know your times

twipe
DIGITAL PUBLISHING

Google DIGITAL NEWS INITIATIVE

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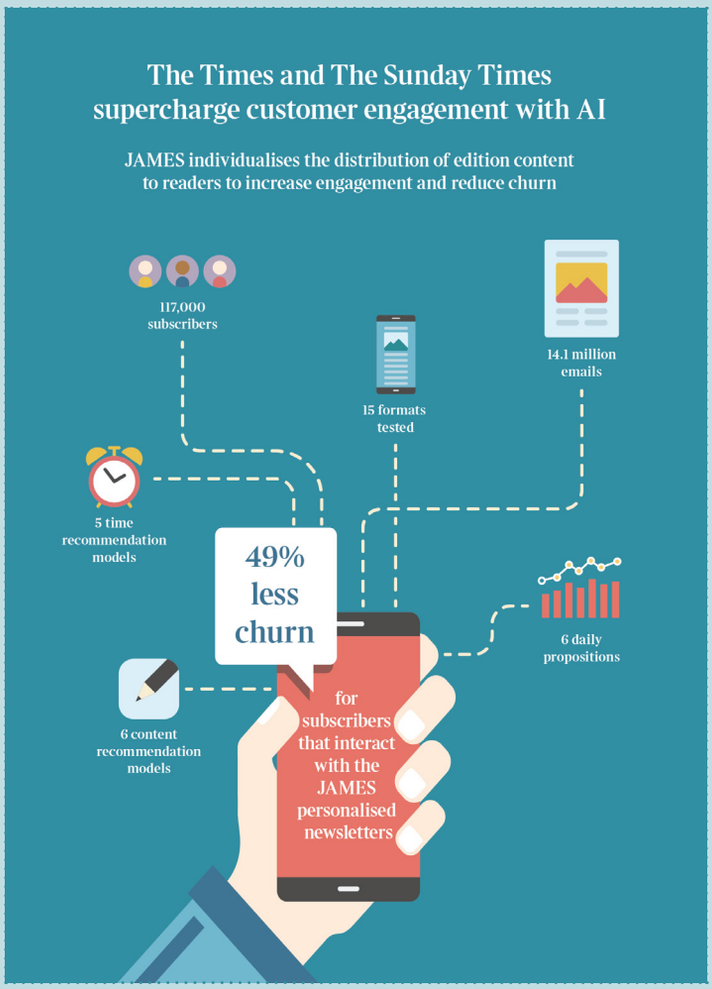


"JAMES, your digital butler" is an AI technology developed collaboratively by The Times & The Sunday Times and Twipe with partial financial support of the Google Digital News Initiative. This document summarises the key findings and insights resulting from this project.

During a 1-year project JAMES served over 100.000 subscribers of The Times with individualised newsletters compiled from the content of a daily edition. Several optimisation algorithms were developed and tested: time optimisation, content recommendation and format optimisation.

This has resulted in significant impact:

- 70% of the exposed readers interacted with JAMES
- 49% decrease in customer cancellation rate on selected cohorts
- Highest impact on customers with low to medium engagement

JAMES continues to be used and developed at The Times and The Sunday Times and will be made available to the wider industry through the Twipe digital publishing SaaS platform

1. Context

In the 1950s, it was easier to build relationships with customers. You'd go to the corner shop, pick up your newspaper, groceries, and maybe a few odds and ends; have a quick chat with the shop keeper—they'd know your name, what you were excited or worried about and what your weekly order was—and then you'd be on your way, secure in your own habits, with the knowledge that next week the encounter would be, broadly, the same.

That's not how we do things today. A plethora of choices and ever decreasing prices demand that, to survive what seems like never-ending consumer promiscuity, brands need to build long-term, meaningful relationships with their customers. But it's not as easy to strike up a meaningful conversation with customers as it once was: how can you build a relationship with a customer you've never met? How can this be done meaningfully, at scale and still be cost effective?

If it sounds daunting, that's because it is. Most people would identify this as the defining challenge for all businesses in the digital era; it is relationship marketing nirvana: knowing who to speak to, what to say and how to say it meaningfully, at cost. It's all about finding the right content for customer A, knowing when to send it and how to frame it so the business and consumer can effectively balance the value equation. How many companies can you name that do this? Unfortunately, the reality is that—without the right tools—it just isn't possible.

It was in contemplating how to meet this challenge that JAMES was borne. The Times and The Sunday Times have worked with Twipe Digital Publishing and, using partial funding from the Google Digital News Innovation Fund, launched JAMES: a CRM decisioning Artificial Intelligence driven by Machine Learning. JAMES, which stands for Journey Automated Messaging for higher Engagement through Self-Learning, is the means by which The Times & The Sunday Times has been able to take decisive steps towards marketing nirvana: getting to know each of your readers and getting them the right content, in the right format, at the right time.

Through initiating this research, we seek to leverage the richness of the 1 billion data points subscribers create everyday to create more meaningful experiences. We focus on discoverability and convenience of content reach and aim to close the perceived value gap. Additionally we sought to explore implementing AI and ML in a large matrix-style company and explore how other newspaper publishers might benefit from such technologies.

We are excited to share the results of our tests with the wider industry and the world in this whitepaper, but, more importantly, extremely proud to have joined a select number of companies, such as Netflix, IBM or Google, that are able to meaningfully build relationships directly with their customers at an individual level.

2. Project

Combining the innovation power and vision of News UK, the agility and experience of Twipe and the framework of Google DNI, the JAMES project was launched in March 2018.

The goal of the project is to grow the subscribers base by individualising the way the content of editions is distributed.

JAMES is a digital butler and the metaphor is not coincidental. Like a butler, JAMES learns and knows the preferences of the user and discreetly serves the right services to them as individuals, rather than at the segment level, long considered best practice for customer marketing. In the context of our project this means that JAMES will analyse and learn how readers read the edition and provide them with the right content at the right time and in the right format.

The aim is thus not to personalise the edition, but to individualise the way it is being distributed to readers, to learn and anticipate user preferences. While content distribution can be done via several means such as messages, social media, audio or push notification, for the purpose of the project, email was selected for our test. Other channels will be investigated beyond the scope of the project.

Project Goal

Accelerate net subscribers growth by individualising the way we distribute the content of the editions to our readers through self-learning algorithms and a bespoke artificial intelligence.

This was mainly due to the simplicity of technical set-up in the project context, but also linked to the maturity of the email as content distribution channel: large reach, availability of tracking technology, consistent industry research to serve as reference and benchmark. Throughout the 12 months of the project more than 14 million emails have been sent to the cohort of readers included in the various experiments.

To explore individualisation algorithms, four dimensions of optimisation have been chosen, together constituting a proposition.

- Time: the best time to send an email
- Content: which content triggers reading
- Format: layout and copy
- Frequency: the number of emails sent

Throughout the project time frame, six different propositions were tested, combining different models of calculating time and selecting content, and have different formats and frequency of sending. This white paper focuses on one of them, The *Daily Briefing Proposition*, to illustrate approach and methodology.

Each of the dimensions will be further explored in the next chapters, as well as the 11 different algorithms for modelling content and time that have been evaluated live including Next Best Action models based on contextual bandits.

3. Approach

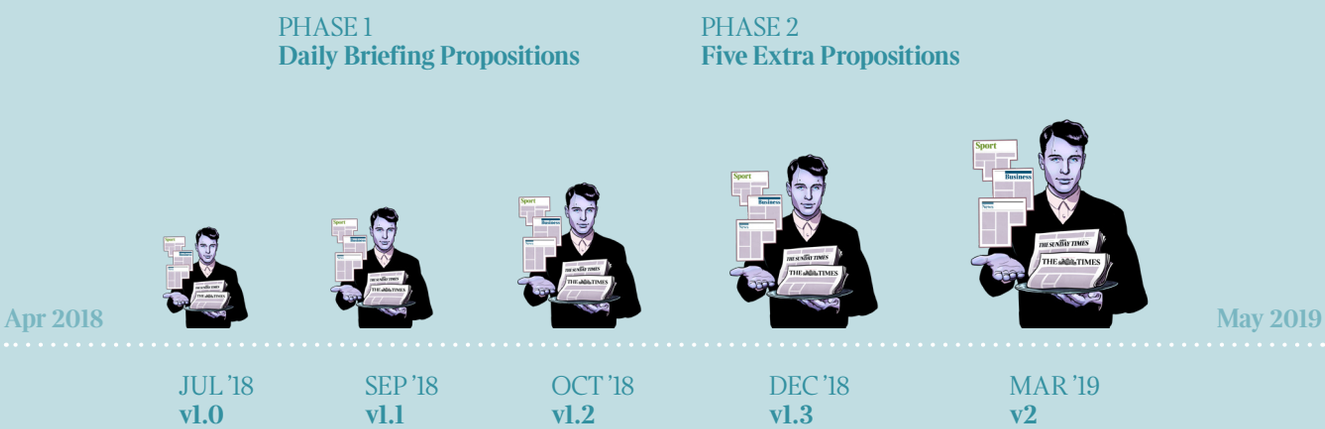


Figure 3.1: Evolution of JAMES – An agile approach

Collaborating with six groups and four countries requires a dedicated approach. During this project, we relied on an agile working practice and iterative development in multiple versions, as illustrated in Figure 3.1.

The project can be split in two main phases. In phase 1 we started with a small scope and worked on independent dimensions for personalising a Daily Briefing newsletter. We rapidly tested algorithms, models and hypotheses, while maintaining a high click rate and engagement thanks to an iterative approach and optimisation steps taken after each experiment. In phase 2,we focused on a holistic next best action model for multiple propositions.

4. The Concept of a Proposition

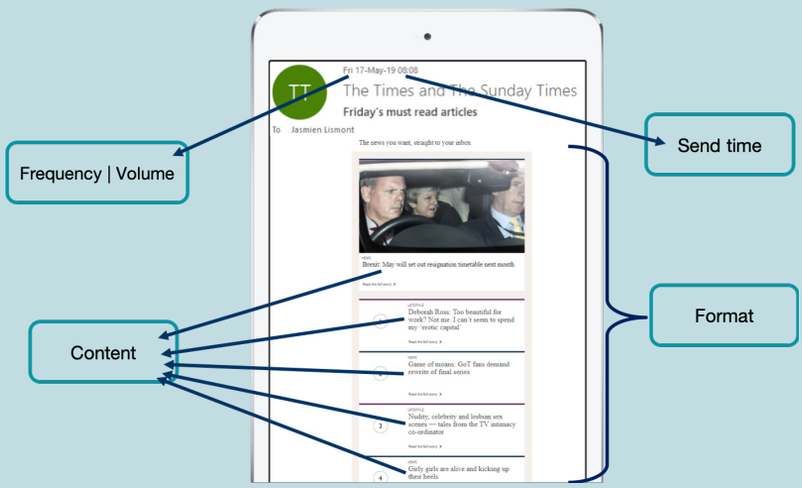


Figure 2: A proposition is a combination of the Send Time, Format, Content and Frequency dimension and targets a specific channel and goal

In order to understand how JAMES works, we need to introduce the concept of a proposition. A proposition answers the questions JAMES needs to answer, as illustrated in Figure 4.1. Namely, when do users like to be contacted? How is the content represented in a format? Which content is presented? What volume or frequency does the user prefer to be contacted? Finally, by means of which channel? The goal of all of the propositions is to increase engagement of users of The Times and The Sunday Times. One can understand that users have different preferences for each of these dimensions. Some might prefer a certain newsletter in the morning with their coffee, or maybe instead during their lunch break or during commute.

Some users might prefer many images, while others a Format just one long article. Frequency is also an important dimension and refers to how regularly the user is contacted with this proposition. This might be daily, weekly or maybe just once in a while when it's needed and desired.

In phase 1 we focused on one particular and important proposition: The *Daily Briefing Proposition*. Illustrated in Figure n, It summarises the daily edition with specific content in a format selected for a particular user. The frequency is set to daily and we investigate what the ideal (personal) send time is for this user. This was sent to selected readers using various models of time, format and content optimisation as described in further chapters.

4. The Concept of a Proposition *(continued)*

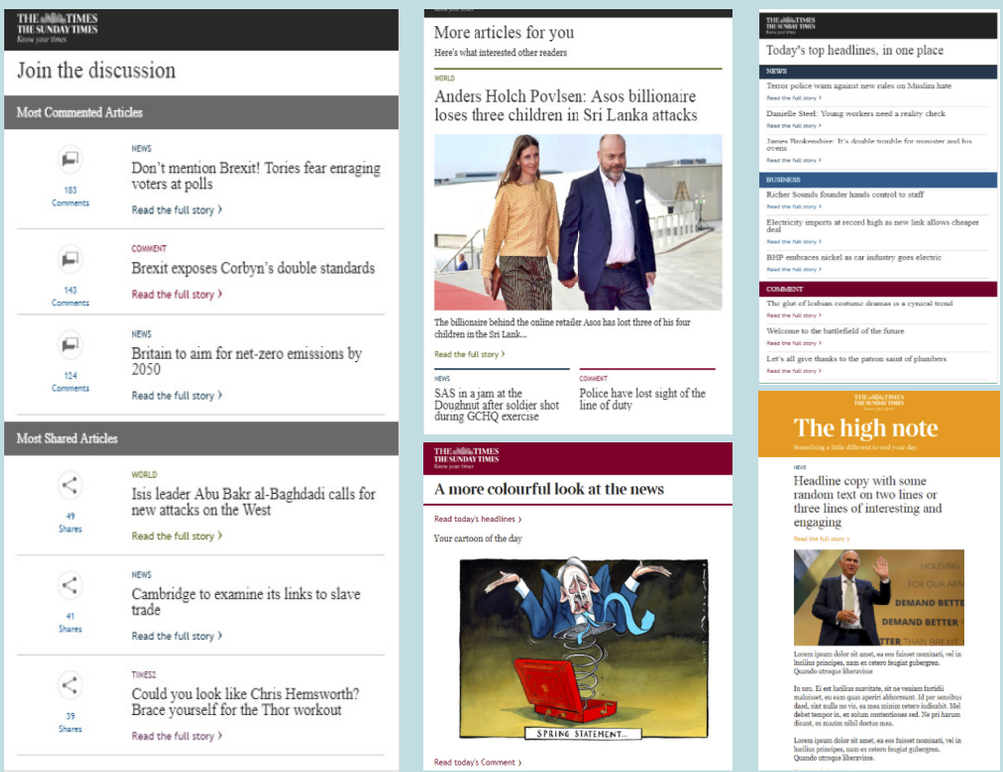


Figure 4.1: A proposition is a combination of the Send Time, Format, Content and Frequency dimension and targets a specific channel and goal

In phase 1 we focused on one particular and important proposition: The *Daily Briefing Proposition*. Illustrated in Figure n, It summarises the daily edition with specific content in a format selected for a particular user. The frequency is set to daily and we investigate what the ideal (personal) send time is for this user. This was sent to selected readers using various models of time, format and content optimisation as described in further chapters.

In Phase 2 we experimented with five new propositions to better hone our approach to individualisation. This allows us to analyse whether subscribers prefer certain propositions by means of a personalised next best action algorithm. Eventually, JAMES will create propositions in real-time for each user, but for the sake of the test we created them manually. These propositions were sent to readers using a contextual bandits-based Next Best Action model and are illustrated in Figure 4.2. This whitepaper covers the insights from the JAMES *Daily Briefing Proposition*.

The five other propositions can be described as follows:

- Top Headlines Proposition: 20 articles sent at 7AM and mixing personalised and most popular articles per section.
- Suggested Reading Proposition: 3 personalised articles sent at 7AM.
- Cartoon Of The Day Proposition: the cartoon of the day sent at noon.
- Top Commented & Top Shared Proposition: top 3 commented and top 3 shared articles of the day sent at noon.
- The High Note Proposition: daily a positive news article sent at 5PM.

5. Methodology

The goal of JAMES is to deliver content to readers as they prefer it, on their terms. As initially we focused on the *Daily Briefing Proposition*, by definition, this means that the frequency was set to daily.

We thus start from hypotheses linked to send time, format and content to be tested:

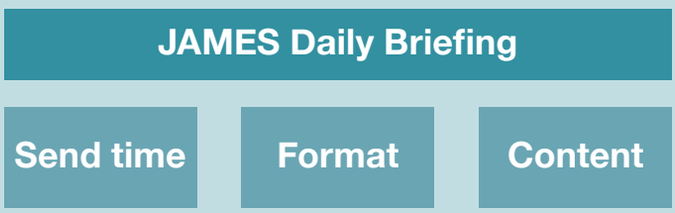


Figure 5.1: Dimensions of the JAMES Daily Briefing

- Hypothesis 1: The engagement with JAMES is not correlated with the time of sending a newsletter.
- Hypothesis 2: The engagement with JAMES is not correlated with the format of the newsletter.
- Hypothesis 3: The engagement with JAMES is not correlated with the content of the newsletter.

Each of them is evaluated by analysing newsletter performance (open rates, and click rates) and the change in Customer Engagement Score, which is a metric developed by The Times and The Sunday Times to measure readers' engagement.

In order to test these hypotheses, three experiments were set up: one focused on time, employing four different algorithms for time prediction, one on content, employing two different algorithms for content recommendation as well as editorial selection, and one on format, employing nine different variations in layout and framing of the emails.

Thus, readers received different newsletters at various times of the day in different formats and with different content. The control group is the same for each of the experiments: people receiving a newsletter at 7am with content based on the most popular unread recent articles per section and using a standard format of five articles with images and headline. Note that initially, interaction effects are not taken into account.

In Phase 2 of the project, five new propositions were added to further test two more hypotheses:

- Hypothesis 4. The engagement with JAMES is not correlated with the Frequency of sending a newsletter.
- Hypothesis 5. Subscribers of The Times and The Sunday Times have a preference for certain propositions.

Sample selection

For the *Daily Briefing Proposition*, we selected a representative sample o f 60,000 subscribers who were not receiving any other newsletters. They were split into three equal sub-samples assigned to each of the three experiments. Each experiment applied an interleaving methodology (see Chapelle et al., 2012, "Large-Scale Validation and Analysis of Interleaved Search Evaluation", ACM Transactions on Information Systems, Vol. 30, No. 1, Article 6). This means that each user will be subjected to each of the models of the experiment they are divided into. We will refer to this sample as the original sample.

At a later stage the sample was extended with new fresh cohorts for other experiments and the other propositions. In total throughout the project 114.000 readers have been exposed to the various JAMES emails.

6. Algorithms

Send time

To discover the best time to send, we experimented with five send-time models. The control group for the send time experiments received their newsletter at a fixed time, 7am BST.

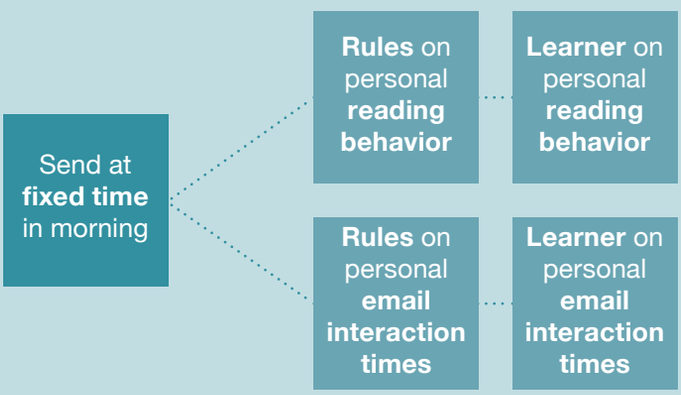


Figure 6.1.1: Models used for predicting best send time in the JAMES Daily Briefing Proposition

In order to reject our hypothesis H1, we first aimed to predict the most engaging newspaper reading time per subscriber. We assumed this would be a valid proxy for a good newsletter send time. Since we hadn't sent any newsletters yet, we didn't have the option to optimise for newsletter engagement time, though we did have anecdotal evidence from previous efforts unrelated to the JAMES project. In the initial version, two models were developed to predict the most engaging reading time per subscriber. We developed a rule-based model and a predictive model using regression forest techniques. A regression forest was chosen after testing various predictive modeling techniques offline, and in general achieves good performance (Lessmann et al., 2015, https://doi.org/10.1016/j.ejor.2015.05.030). Both models are personalised, but the rule-based model uses heuristics based on your personal reading history, while the learner learns your reading patterns and predicts them.

We quickly learned that newspaper reading time is not the best predictor for newsletter reading time, with large time delays witnessed between the two actions.

Using data from the opening and click history of the JAMES newsletters from this first experiment, we then developed a predictive model for the opening time of a newsletter. Also in this case, one model was rule-based while the other was a predictive model, this time based on an angular regression technique whereby we minimise the 'angle' between send and opening time of a newsletter. Similar to the previous version, both models are personalised, but the rule-based model is less complex to execute and doesn't require training.

6. Algorithms *(continued)*

Format

A variety of formats were explored within the JAMES project as a combination of layout elements such as number of articles, number and position of the images, displayed lines of text, colours used, etc, and framing elements such as text and salutations, preview texts or subject lines. For example, Figure 6.2.1 illustrates three different formats for the daily briefing propositions.

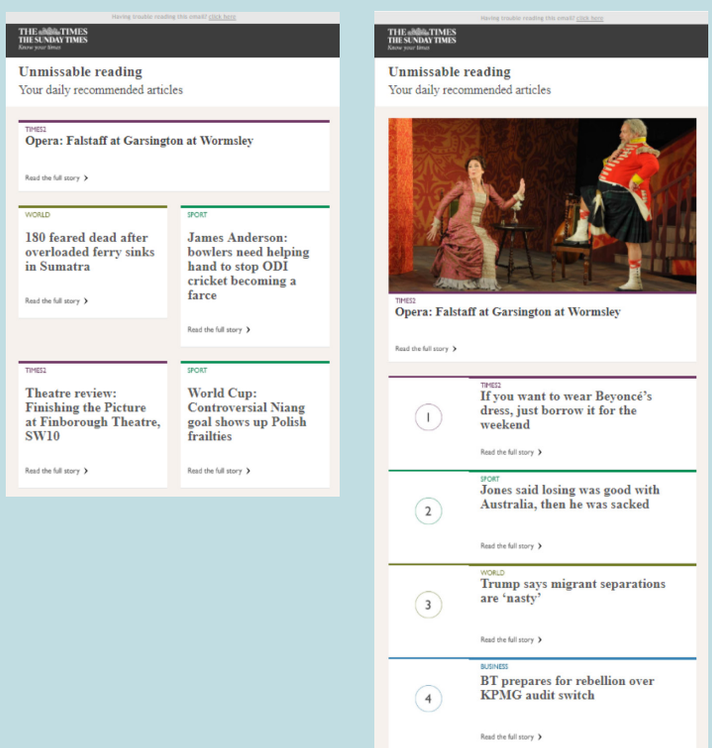


Figure 6.2.1: two different formats for the daily briefing

6. Algorithms *(continued)*

Content

An important newsletter dimension is the content we select for the proposition. This can be either human selection - also called editorial selection - or machine selection based on rules and/or models.

Figure 6.3.1: Models used for selecting content of JAMES emails

In phase 1, for the *Daily Briefing Proposition*, three content models were developed and applied.

1. Editorial selection: every morning the editorial team selects a set of 5 articles.
2. Most popular: a model selects the top performing non read articles, one per section, based on number of clicks generated by that hour.
3. Content recommender that uses topic modeling: based on the reading history per user of the past 28 days, we match their preferred topics to the topics of today's articles.

The baseline which was kept during the entire experiment is the 'most popular' model. This also acted as a fall-back model in case personalisation wasn't feasible due to not enough reading behavior observed or other reasons.

After initial results analysis, an optimisation step resulted in a new content model which optimises the two machine-based models (2 and 3 above) into a fourth, hybrid model combining both aspects of popularity and content recommendation based on user topic preference.

During phase 2, for each of the 5 new propositions explored with an NBA model, a different content model was applied.

- The Top Headlines Proposition applies a stacked combination of the personalised content recommender and most popular.
- The Suggested Reading Proposition applies a collaborative filtering content recommender[1] . Such a model looks at how close your interests are to those of others and then recommends the articles read by users whose interests match yours the closest.
- The Most Commented & Most Shared Proposition is a variation of most popular. Instead of basing ourselves on reading behavior, however, we now base ourselves on social characteristics of articles. Articles which receive many comments or are shared often are selected.
- The Cartoon Of The Day Proposition is automatically selected based on this section in the edition.
- Finally, The High Note Proposition is editorially selected on a daily basis.

Note that all models, except the editorial selection, exclude read articles.

6. Algorithms *(continued)*

Next Best Action model for combination of dimensions

In order to test whether subscribers have a personal preference for a certain combination of the mentioned newsletter dimensions, a Next Best Action (NBA) model was developed to personalise the selection of one out of six actions based on Contextual Bandits. While traditional algorithms learn behaviour based on historical data, this model gathers data to learn from by exploring actions (propositions) at random (exploration). As such it combines exploration of the available actions with exploitation of the actions that it knows work well. Whether an action works well or not is determined based on rewards, which is a combination of reactions interpreted as positive or negative within the model such as clicking on an email or opting out. Initially, exploration of new actions is high, but over time this gradually changes into exploiting the action that works. This decision is taken on a daily basis for next day's recommendations.

The different actions available in the JAMES NBA correspond to the 5 available propositions together with a "Do Nothing" Action:

1. Send Top Headlines Proposition
2. Send Suggested reading Proposition
3. Send Most Commented & Most Shared Proposition
4. Send Cartoon Of The Day Proposition
5. Send The High Note Proposition
6. Do Nothing

The context that the bandits take into account for exploitation of the actions, is based on two elements: (1) user profile and (2) user digital behavior.

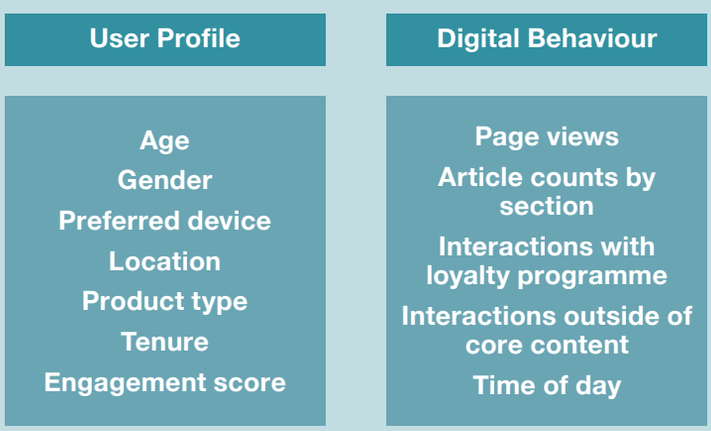


Figure 6.4.1: Context characteristics for exploitation via contextual bandits

7. Insights

An increasing amount of readers were reached, and opt-out quickly stabilised.

As mentiond in Chapter 5, in the original sample, we exposed 60,000 subscribers who didn't receive a newsletter at that time, to different variations of the JAMES *Daily Briefing Proposition*. Each day, during a period of 10 months, they received a JAMES newsletter. Their engagement with this newsletter is visualised in Figure 7.1.

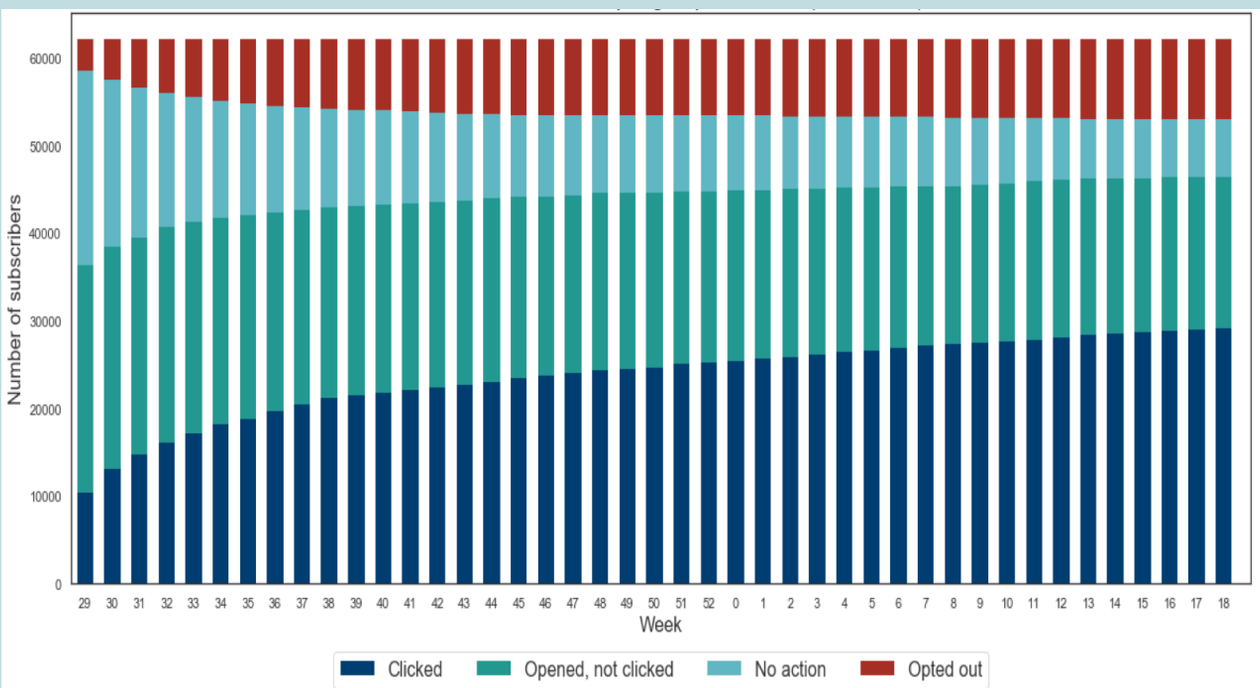


Figure 7.1: Evolution of the original 60,000 subscribers receiving JAMES Daily Briefing Proposition

7. Insights *(continued)*

The first observation we make, is an increasing amount of subscribers reached. Every week, the cumulative number of people who interacted with JAMES by clicking or opening increases to more than 70% at the end of the project. Additionally, we observe that the increase in subscribers who interacted by clickthrough is drawn from the people who only open (and not click through) but mostly from the people who do not interact at all. A second observation that stands out is the rapid stabilisation of the amount of opt-outs, ending at approximately 15%. Finally, we observe that there's a small group of people who never react to the *Daily Briefing Proposition*. Either they can be targeted by a different proposition or not disturbed at all. Alternatively, email is not the preferred channel for this group of subscribers.

People who interact heavily with the JAMES *Daily Briefing Proposition* exhibit increased engagement with The Times and The Sunday Times.

Figure 7.2 illustrates a split of the group who clicked through on at least 10% (almost once a week) of the *Daily Briefing Proposition*, between 5 and 10% and below 5%. Then, we look at how much their engagement index increased since the start of JAMES up to now. This index is strongly linked to churn and, as such, if we can increase engagement, we will sustain subscriber net growth. We observe that the readers who click through on the JAMES *Daily Briefing Proposition* have increased their engagement with The Times significantly. Moreover, the more they interact and engage with JAMES, also the larger the increase in their engagement with The Times. Furthermore, we can assume that for the *Daily Briefing Proposition* click through rate is a good short term measure, given its correlation with the actual long term goal of increased engagement with The Times.

Increase in engagement with The Times and The Sunday Times

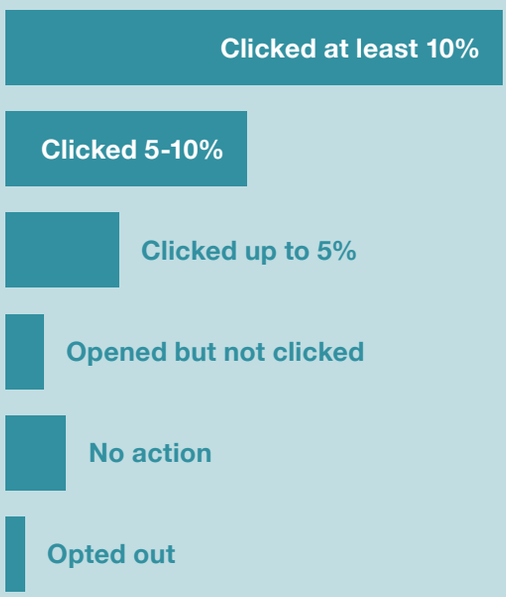


Figure 7.2: Increase in engagement index for different interaction groups with JAMES daily briefing

7. Insights *(continued)*

If we segment the JAMES sample according to their engagement index prior to JAMES (low, medium or high), we observe that the *Daily Briefing Proposition* works better for low to middle engaged subscribers. This is an important finding as we know that increasing engagement amongst low engaged customers is key concern across the industry.

This is illustrated in Figure 7.3. We observe an increased click-through rate for low and medium engaged subscribers compared to highly engaged subscribers. This leads to the conclusion that those we can activate with JAMES are low-to-middle engaged subscribers and, moreover, that we observe the largest increase in engagement for those who do interact with the *Daily Briefing Proposition*.

Click rate per engagement group from low to high

Figure 7.3: Click through rate per engagement group prior to JAMES

Observed decline of 49% in churn for subscribers interacting with JAMES.

This very important observation is statistically significant based on the data from the experiment, which we used to properly assess JAMES interactions.

- The sample most representative for the subscriber base which is the extend sample
- Measured over a period of 5 months
- People who received less than 30 emails were excluded
- People subjected to other campaigns were excluded

Churn of people who interact with JAMES and control group

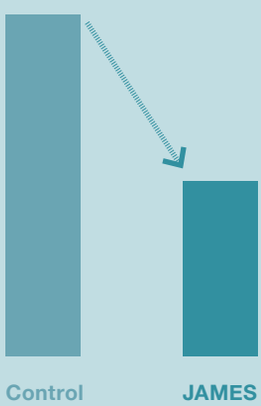


Figure 7.4: 49% less churn observed for people who interact with JAMES daily briefing

7. Insights *(continued)*

The best performing combination is a morning email with a mix of popular and recommended content.

In terms of best performing *Daily Briefing Proposition* emails we found that ideally the email is sent every day at the same time in the morning, with a mix of popular and recommended content in a format which is easy-to-consume.

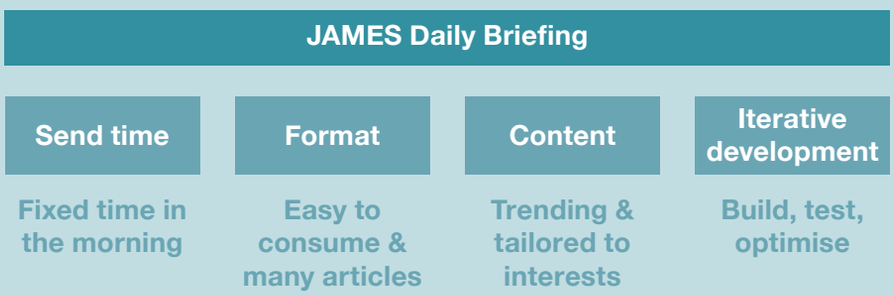


Figure 7.5: Key learnings about composition and development of JAMES Daily Briefing Proposition

Time: fixed time performs best

As described in chapter 6.1 we used 5 models for optimising send time. While there are individual preferences, when looking at overall performance the best performing model for sending a JAMES *Daily Briefing Proposition* was the baseline fixed time model of 7am, Furthermore, this is also supported by the belief that receiving your daily briefing every day at the same time, allows for better habit-creation which is an essential part in creating recurring behavior.

7. Insights *(continued)*

Format: more articles, more interaction

In terms of format, while there are individual preferences observed, there were common trends in layout preference, such as layouts that limit the number of images and scrolling time in order to make email content easier to consume or formats that have a larger number of articles. One format displayed as many as 20 articles where a very high click through rate was observed.

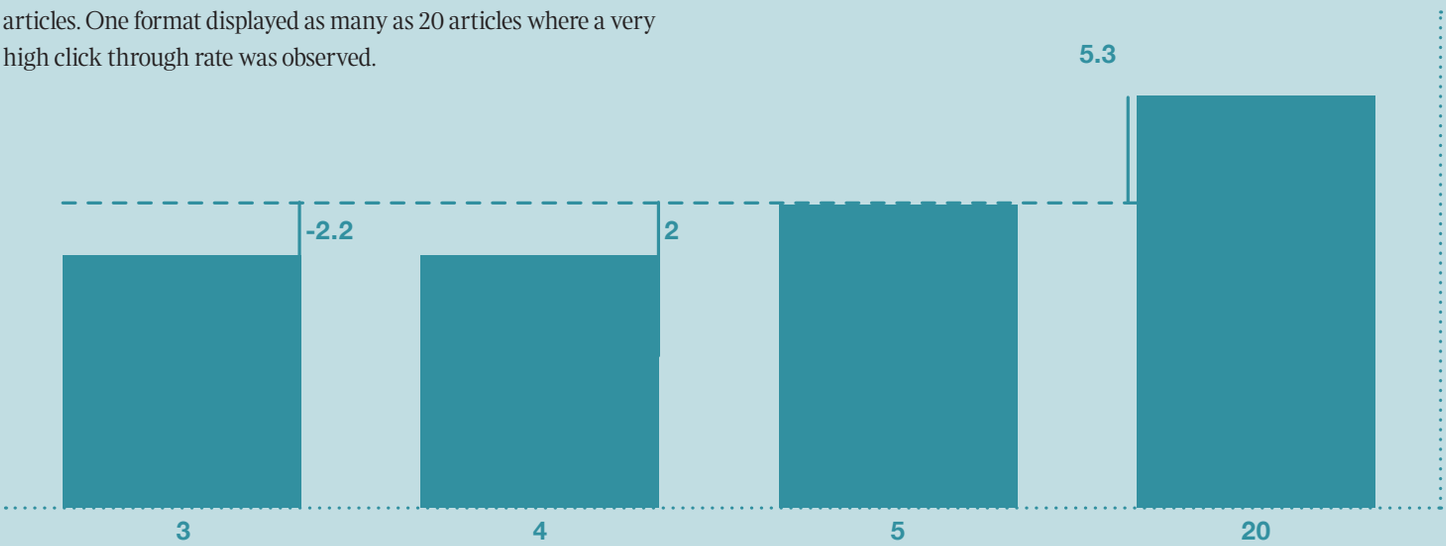


Figure 7.6: Comparison of effective clickthrough rate performance for formats with different articles

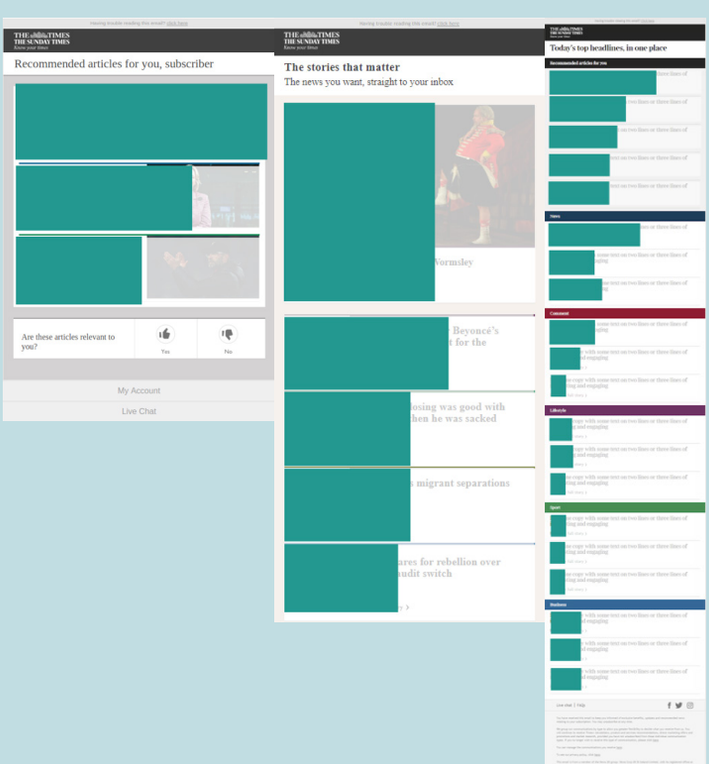


Figure 7.7: comparison of article click through rates for the format with three articles, the baseline format with five articles, and the format with twenty articles

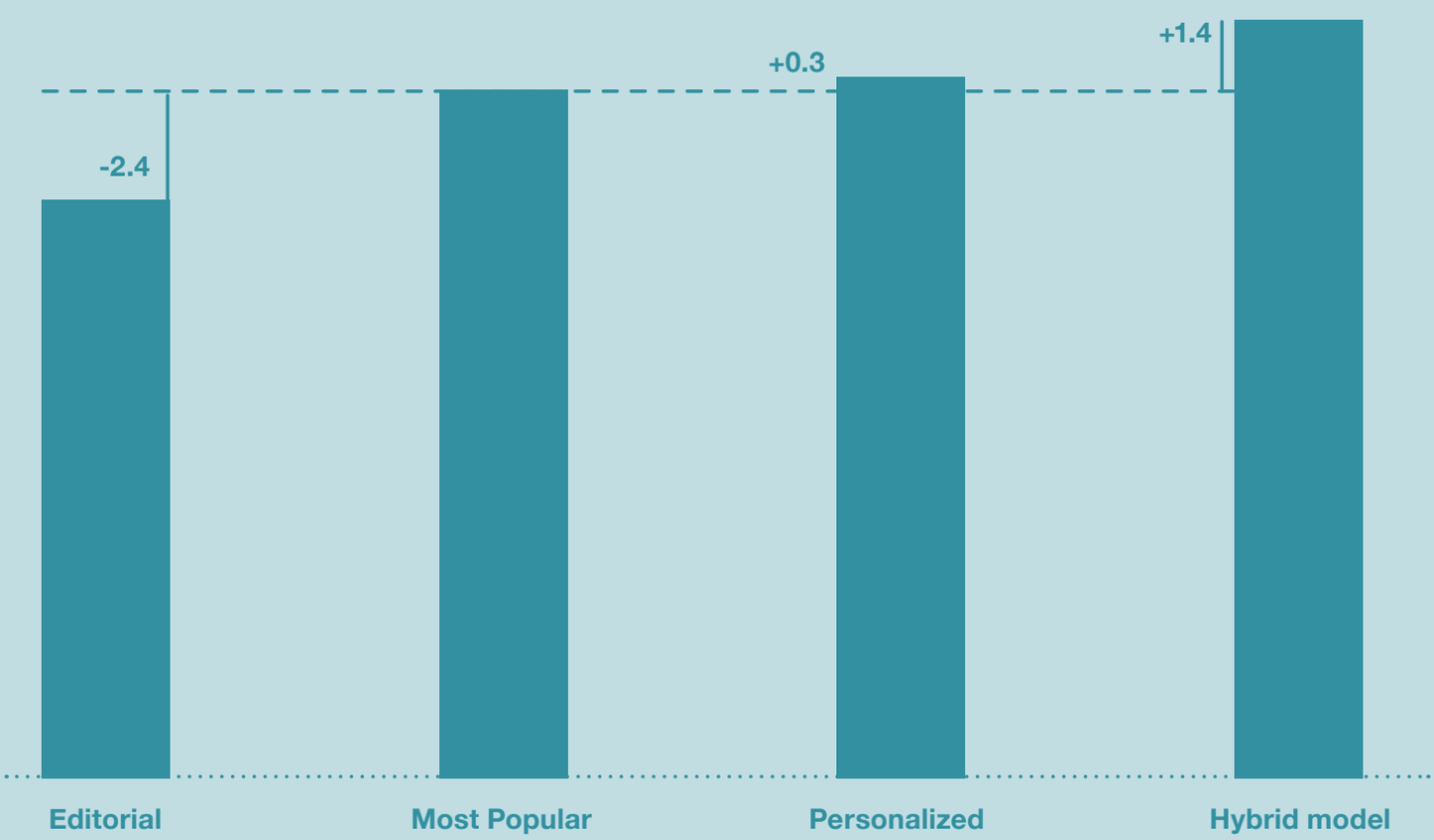
7. Insights *(continued)*

Content: Hybrid model performs best

In terms of content, we observe that while JAMES must serve readers with content that matches their personal interests, popular content still plays a role in a *Daily Briefing Proposition*. We find that the closer an article topic matches to a reader's personal interests, based on past reading behavior, the higher the click rate, but also that the more popular an article is - given that it has not been read yet - the higher the probability of receiving a click. This can be interpreted as a desire of readers to be up to date with popular news while being also informed about topics of personal interest.

The cases when JAMES could find a combination of both factors in one: namely serving an article which match personal interests and is also popular to an individual could generate up to 8 times higher click rates.

As a result we developed a hybrid model which combines the results of popularity and content personalisation. In Figure n, you can observe the impact on effective click rate versus the baseline on the overall cohort.



8. Conclusion and Next Steps

Throughout this one year project we learned that there is a high potential for the use of AI to create better customer experiences, by creating reader engagement with automatically generated emails.

Furthermore, we learned that sometimes – like in the case of optimising send time for a proposition like the Daily Briefing – a fixed time in the morning can perform better and have a habit-building power.

We also learned about the importance of mixing personalised content with popular content. These are important takeaways for the use of AI in generating individualised emails for the news industry.

As for next steps, The Times and The Sunday Times will focus on analysing the data, fine tuning algorithms and exploring new propositions, whilst Twipe focus on bringing the technology to the market via theTwipe platform.

About The Times & The Sunday Times

The Times and its sister title, The Sunday Times, are currently the biggest selling quality print newspapers in the UK. In 2018 The Times, Britain's oldest national daily newspaper, was named Britain's most trusted national newspaper by the Reuters Institute for Journalism at Oxford University.
The Times & The Sunday Times have focused on a unique paid content strategy with the digital edition at the core, being the first newspapers in the UK to set up a paywall in 2010

About Twipe

Twipe is a leading technology provider for the newspaper industry with a unique focus on helping publishers distribute their digital editions on mobile devices and generate more reader revenues from paid content. Leading newspaper publishers like Le Monde, Ouest France and DuMont Mediengruppe are amongst the key customers of Twipe.

“This is marrying tech with journalism.”
Nick Petrie, Deputy Head of Digital, The Times & The Sunday Times

“Just like an ideal butler, JAMES observes you, remembers where, when and how you like the news to be served and then does it for you without you even noticing.”
Danny Lein, CEO Twipe

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