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With next-day delivery and even same-day delivery becoming standard, companies like Amazon and Alibaba are experimenting with drone technology to quickly get packages into the hands of customers. Early testing focuses on the practical question of how this can be done, but we took a step back to ask whether it is worth doing at all. Using a combination of a traditional delivery truck and a companion drone, our model says yes.

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Web-based user-generated content represents a potential goldmine for marketers trying to sell their products to the largest possible number of potential buyers. Getting previous consumers to give their products the online thumbs-up may seem like a guaranteed winner, but such a promotional strategy comes at a cost – a monetary cost and also the risk that paying consumers to deliver positive reviews may backfire on the grounds of credibility.

# Introduction

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## Adopting new technologies of the Fourth Industrial Revolution

Business model innovation through the introduction of new technologies is an obvious lever for competitive advantage. There have been successive waves of technology that have given rise to new business models. During the Industrial Revolution, the arrival of steam made it possible to mechanize production. This saw the rise of companies that provided and used steam engines, such as steam mills and locomotives. There was arguably a second similar revolution roughly a century ago, driven by the invention of electricity and other technologies such as the combustion engine, aeroplanes, and moving pictures. The use of electricity led to mass production. A third wave of industrial development came with the rise of the personal computer, digital technology, and the internet, which led to greater automation of production through the use of IT.

The most recent wave is based on a fusion of technologies that fully integrate digital, physical, and biological environments. Technologies that were previously separate, such as artificial intelligence and machine learning, robotics, nanotechnology, 3D printing, genetics, and biotechnology, have come together to build on one another. Developments such as the Internet of Things, big data, portable and implantable technologies, and driverless cars have brought about completely new and unexpected business models. Drone technology is allowing Amazon.com to experiment with new and potentially faster logistical services, so that established parcel delivery companies now risk being pushed out of Amazon's value chain for regional transportation.

This is just one of the fascinating subjects explored in this issue of *RSM Discovery* magazine. This issue also features research-based articles that provide the latest insights into: the benefits of taking a systemic approach towards innovating your business, and whether new technologies should be developed in-house or co-created with outsiders; how perceptions of trustworthiness and fairness among employees can benefit organizations and individuals; the value of independent research in improving investment allocation decisions, and the role of social influence in online product reviews.

I am sure you will find these articles to be most stimulating and welcome any comments that you might have.

### Henk W. Volberda

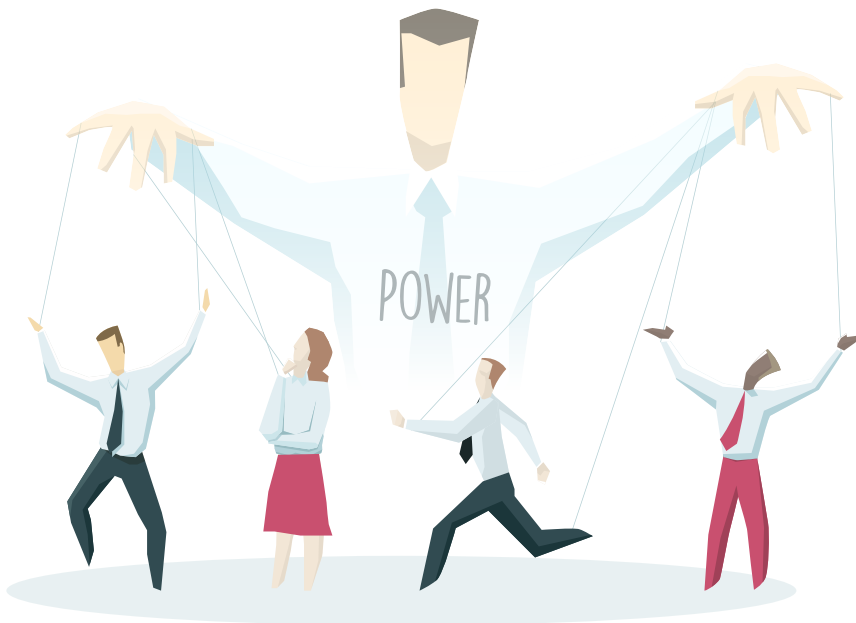
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# The influence of power on prosocial behaviour

Chris Murray talks with **Marius van Dijke**

**The familiar quote** that ‘Power tends to corrupt and absolute power corrupts absolutely’, is a commentary on the negative relationship between power and what scientists call “prosocial behaviour” – that is, taking action above and beyond one’s duties for the good of the team or the community to which one belongs. In the context of business, someone voluntarily helping a colleague without any expectation of reward or recognition is engaging in prosocial behaviour, also known as organizational citizenship behaviour or OCB.



‘You could say that OCB is perhaps the best researched type of prosocial behaviour in actual organizations and, also, the type of behaviour that interests managers most,’ says Marius van Dijke, professor of behavioural ethics at RSM.

In a paper published in the *Journal of Applied Psychology*, Prof. Van Dijke and three colleagues detail the influ-

ence of power on prosocial behaviour in organizations. Their research breaks with previous research by focusing on organizational context and breaking down the different types of power. The results of their study offer managers new ways of understanding how to promote prosocial behaviours in their organizations.

## Power and personality

As Prof. Van Dijke explains, previous studies have led to contradictory results concerning the relationship between power and prosocial behaviour. Some studies show that power indeed corrupts: more power leads to less willingness to engage in selfless acts that offer no self-benefit. In other studies, however, power seems to *encourage* greater prosocial behaviour.

Scientists have explained this discrepancy, Prof. Van Dijke says, by concluding that power amplifies one’s personality. ‘The relationships between personality and power are complex,’ he says, ‘but there is some research that quite convincingly shows that power makes who you are come out more.’ If you tend to be less selfish, in other words, power will make you more prosocial. If your tendencies are the opposite, then power amplifies those negative tendencies, and you are less prosocial.

However, this “dispositional” explanation of power’s impact on prosocial behaviour is only part of the story, Prof. Van Dijke says. For the past 10 years, he has been studying an element in the equation that has been for the most part ignored in previous research: the organizational context of prosocial behaviour. Specifically, Prof. Van Dijke has been focusing on an organization’s *procedural justice*, that is, people’s perception of whether leaders of the organization are making decisions fairly.

## The fairness of leaders

As he explains, people want to help their organizations succeed by going ▶



# The influence of power on prosocial behaviour *(continued)*

Chris Murray talks with **Marius van Dijke**

beyond their required and remunerated duties. At the same time, however, research shows that people don't want to be taken advantage of, or somehow undermine their own success through their selfless actions. In short, he says, people will act prosocially if they are convinced that management is *trustworthy*, which is why procedural justice is important.

'When you're at the bottom of a hierarchy, you have absolutely no idea of the real intentions of your leaders,' Prof. Van Dijke says. 'You have probably never met them in person, let alone spoken to them. You need some kind of indirect information of whether or not they will take advantage of you, of their trustworthiness.' Procedural justice, he says, concerns the fairness of 'far-reaching decisions being taken, for instance, about your salary, about promotion opportunities, about how the organization is organized. It gives us information about the integrity of top-level management.'

## Two types of power

Prof. Van Dijke notes that he is not the first to link procedural justice to prosocial behaviour. However, when he began to research the influence of power

on this process, he realized that previous researchers had not differentiated between feeling powerful and actually being powerful – a critical difference, he says. 'If you carefully look at what these power research studies actually do, they do not manipulate actual power,' he says. 'They manipulate how powerful you *feel*. That was the start of my exploration for this research.'

Actual power, in Prof. Van Dijke's terminology, comes from being in a hierarchical position of power: you have been given the authority to exercise power. However, someone without the power of an authority position may still feel a sense of power, perhaps from their experience and knowledge, the respect of others, or the ability to influence others. And people in a position of authority may actually feel powerless, for example, if they do not have the respect of their followers.

Having differentiated hierarchical position power from the subjective *sense of power*, Prof. Van Dijke and his colleagues then explored whether the two different types of power would have a different impact on the issue of procedural justice and thus prosocial behaviour. Their conclusion is highlighted in the title of their pa-

per, *Ranking Low, Feeling High: How Hierarchical Position and Experienced Power Promote Prosocial Behavior in Response to Procedural Justice*.

According to Prof. Van Dijke, the results show that people who are in a *lower hierarchical position* of power are more likely to engage in prosocial behaviour than people in a higher position. On the other hand, people who have a *higher sense of power* – who subjectively feel powerful – are more likely to be prosocial than those who feel less powerful.

## Being willing and able

The reason for these opposite effects, Prof. Van Dijke explains, is that procedural justice will impact prosocial behaviour only when people are paying attention to procedural justice. 'If you don't look at something, it's not going to affect your perceptions, of course. So being in a *low* hierarchical position makes you more likely to look at the fairness of procedures because you feel more vulnerable.' On the other hand, he says, 'in order to effectively act upon your intentions, you need to feel powerful, and that's what a sense of power does.'

Another way of looking at the three-way interaction between procedural justice, low hierarchical power and high sense of power 'is in terms of being willing and being able,' he explains. 'Being in a low position, low in the hierarchy, makes you look at procedural justice. It makes you *willing* to act upon the fairness of treatment, but you're not able yet. The high sense of power makes you *able* to act upon that.'

*"When you're at the bottom of a hierarchy, you have absolutely no idea of the real intentions of your leaders."*

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*“It's not because employees don't want to benefit their organizations. They're simply sometimes afraid to do so...”*

At the beginning of the research, Prof. Van Dijke expected that hierarchical power and a sense of power would influence in different ways whether or not a person engaged in prosocial behaviour. What he did not expect, he says, is that the two different types of power would interact – that the combination of low hierarchical power and high sense of power would ‘strengthen each other’s effect even further.’

### Management lessons

There are a number of lessons that leaders and managers can draw from this research, he says. The first clear lesson is that managers must pay attention to perceptions of trustworthiness in general and procedural justice in particular. ‘Scientists may know that procedural justice promotes prosocial behaviour, but managers don't seem to always know that,’ Prof. Van Dijke says.

Although intuitively, it would seem that leaders would want to maintain positive perceptions of management decision-making, in reality ‘there are various reasons why they don't want to be procedurally just,’ he says. ‘For instance, giving people a voice in decisions, which is one aspect of

procedural justice, is time consuming – and you may be afraid of giving away secrets to people who don't need to know about them.’ Nevertheless, ‘this is one paper that shows that procedural justice is really valuable in promoting organizational citizenship,’ he says.

Another lesson is for managers to better understand the fear or wariness of employees that can hold back prosocial behaviour. ‘Managers sometimes tend to forget that employees, even those they work with on a daily basis, are, to some extent, scared of those managers,’ he says. ‘That explains why sometimes employees don't act the way managers want them to act. It's not because employees don't want to benefit their organizations. They're simply sometimes afraid to do so – or, very often, feel incapable of doing so.’

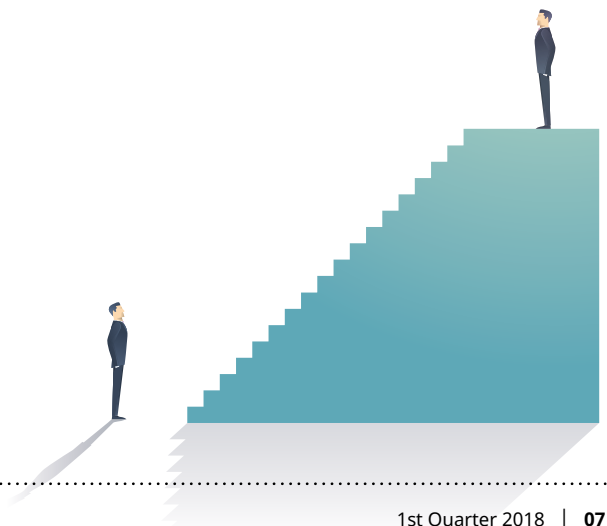
In short, managers must not simply assume that the lack of prosocial behaviour reflects a lack of engagement. They need to explore alternative motivations that might be undermining the organizational citizenship of their employees. For example, do lower-level employees feel powerless? Have upper-level managers lost the motivation to engage in prosocial behaviour?

While the positive impact of procedural justice is well-documented, Prof. Van Dijke's research exposes the psychological nuances of the different types of power that explain why CEOs who do everything to ensure fair leadership decisions and behaviour will see their efforts rewarded by employees who go above and beyond.

■

**The paper *Ranking low, feeling high: How hierarchical position and experienced power promote prosocial behaviour in response to procedural justice*, written by Marius van Dijke, David De Cramer, Gerben Langendijk, and Cameron Anderson, is published in the *Journal of Applied Psychology*, Vol 103(2), Feb 2018, 164-181. DOI: <http://dx.doi.org/10.1037/apl0000260>**

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# Is it better to look inside or outside for innovation?

By *Justin Jansen and Vareska van de Vrande*

## Which is a better approach to innovation: to look internally and develop a more advanced version of something you already know, or to look externally and find something new?

To find out, we analysed more than 36,000 patents applied for by semiconductor firms between 1991 and 2001. We looked at patents that relied mostly on internal knowledge and patents that relied mostly on external knowledge. At the same time, we also subdivided the data between inventions by size of team and each member's degree of invention experience.

Although it might seem counter-intuitive (after all, why should the source of knowledge used in the invention or the size of the team have any bearing on whether an idea is any good?), we found that the quality of the invention actually does tend to correlate with a number of factors, including the origin of the knowledge and the size of the team.

### Internal vs external

How much you should focus internally versus externally is one of the eternal questions of management. For the most part, the conclusion has been that to thrive, companies need to be ambidextrous in this respect.

When it comes to research and development, however, this question of internal versus external focus has remained unresolved. Management and innovation scholars have suspected for some time that the source of knowl-

edge mattered, but just how was not clear. On the one hand, inventions that draw on some new knowledge are likely to be of higher quality than those that only recombine existing knowledge. On the other hand, if a team uses too much external knowledge, it may not be taking full advantage of its own expertise.

There is something to be said for "sticking to your knitting". Firms are usually better at employing and transforming the knowledge they already possess into appropriate and competitive offerings. An invention that involves too much new knowledge won't fully utilize a firm's advantage and core competence, and is thus less likely to be competitive in the market. Firms that look too far afield will also have less understanding of how best to apply the new knowledge. This usually means that a firm will be entering an area where the other firms already

have a foothold and advantage, thus decreasing the likelihood that the invention will be particularly valuable. It's worth keeping in mind that innovation is also partly a social phenomenon, so a research team coming up with something far from its home turf may find it hard to sell the product. Monsanto probably has the expertise to make a perfectly good shampoo, but would the market buy it?

Many scholars have argued that the most successfully innovative firms are those that know how to balance exploration (looking for knowledge outside of the firm) with exploitation (developing new ideas by applying knowledge you already have in a new way). However, this was mostly a feeling they had; nobody had been able to prove this empirically.

In our study, we used patent data to see if their intuition was correct. To measure the degree of exploration (external discovery outside their own domain), we used the number of external citations in the patent application as a rough proxy of reliance on external knowledge. To measure the degree of exploitation (internal discovery within their own company), we counted the number of times they cited their own

*"...a research team coming up with something far from its home turf may find it **hard to sell the product.**"*



inventions. Finally, to measure their level of innovativeness, we counted the number of times their patents were subsequently cited.

Overall, we found that balanced patents – that is, patents with a mixed pedigree of internal and external sources – tended to be a little more innovative, judging by the fact that they are cited in subsequent patents 4.7 per cent more often than the average patent application.

### Team composition

Another factor that scholars have thought might affect the degree of

exploration versus exploitation is the composition of the development team. Some studies have found that the background of team members matters. For example, researchers have shown that teams with more diverse knowledge fail less often and teams with more generalists tend to come up with more economically practical inventions. However, before our study, no one had looked at how the size of the team or their level of experience might affect their propensity toward exploitation or exploration.

We found that balance tended to be positive here too: the most successful

inventions (in terms of forward citations) tended to have been developed by teams of moderate size (around four) with moderate experience. Why should this be?

Our hypothesis is that larger teams, because they have more expertise in-house, feel less need to search for answers beyond their own laboratory. This saves them time in that they won't over-explore, but the downside is that their inventiveness may suffer, as they may become somewhat myopic. Larger teams will have sufficient knowledge at hand to come up with inventions and solve technological problems without going outside the team. As a result, they are less likely to perceive the need to incorporate new knowledge, even though mathematically they have more opportunities to access new knowledge.

Organizational dynamics may play a role as well. Some scholars have found that larger teams tend to have more interpersonal conflicts, which can interfere the group's ability to collaborate.

Experience also appears to discourage exploration. The more prior patents the team had, the less external knowledge they tended to incorporate in their patent. Having multiple team members who know the same technology also seems to reduce exploration. This too makes some intuitive sense: after all, why would you look somewhere else if you already felt you had the answer? Experienced teams will turn first to their existing knowledge, while inexperienced teams will hunt for knowledge from external sources because they don't really have an alternative. ▶



### The Goldilocks effect

Although an invention might seem like something that happens at random, the truth is more complicated. Larger teams tend to generate inventions with more internal knowledge, while smaller teams tend to create inventions with more external knowledge. Our study suggests that the best inventions don't rely entirely on either internal knowledge or external knowledge, but a "just right" combination somewhere in the middle. Team composition too tends toward this same result. This suggests

that the most effective inventing teams include neither too many people nor people with too much experience.

Another practical conclusion that practitioners should draw from our study is that separating exploration and exploitation in different development teams or different locations won't promote more creativity. In fact, our analysis suggests that if Firm A files for one patent that is 100 per cent from internal knowledge and another that's 100 per cent from external knowledge, while Firm B has two patents that were

This article draws its inspiration from the paper *Balancing exploration and exploitation in inventions: Quality of inventions and team composition*, written by Pengfei Wang, Vareska van de Vrande, and Justin J.P. Jansen, and published in *Research Policy* Volume 46, Issue 10, December 2017, Pages 1836-1850. DOI: <https://doi.org/10.1016/j.respol.2017.09.002>

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"...separating exploration and exploitation in different development teams or different locations *won't promote more creativity.*"

the result of a balance of internal and external knowledge, Firm B will be ahead of the game.

Finally, our research suggests that experience and size are both mixed blessings on a research team. Large teams with a lot of experience are more likely to come up with inventions based on their existing knowledge and miss important developments by paying too much attention to what they already know. Mark Twain's quip that "All you need in this life is ignorance and confidence, and then success is sure," may not be quite right, but it does turn out to have a grain of truth. ■

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# Why trust in the workplace matters and how to cultivate it

By **Stefano Tasselli and Martin Kilduff**

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**Advancing your career depends on gaining the trust of others, and while nothing creates trust better than friendships between colleagues, the workplace presents unique challenges for these relationships. A recent study, explored here, reveals which personality traits are the best fit for creating trust in different friendship network configurations.**

Most managers expect their employees to be discreet and neutral in how they interact with each other, particularly when they are from different departments. Insider information should be kept within the team loop and knowledge shared only with those who need it.

The formation of friendships between colleagues, however, brings a whole new dynamic to the workplace relationship. The obligations of friendship, such as openness and favouritism, now compete with organizational obligations for discretion and neutrality – and the successful balance of these forces is largely responsible for the preservation of the key attribute of these friendships: trust.

Friendships in the workplace are one of the most powerful assets an employee can have. Workplace friendships bring multiple benefits to all par-

ties, from increased productivity to better career prospects. Yet they are easily undermined by this conflicting demand for discretion and neutrality. How are these relationships best managed so that trust is preserved and enhanced? And what personalities undermine them?

In our research paper, *When Brokerage between Friendship Cliques Endangers Trust: A Personality-Network Fit Perspective*, we explore when and how trust is facilitated and preserved in workplace friendships. Our focus is on two different friendship network configurations within the workplace: those of employees who operate in a single friendship circle, and those whose friendships span two or more different friendship groups. What emerged from our research is that an employee's personality, in terms of self-monitoring and blirtatiousness, has a pow-

erful effect on the extent to which trust is preserved, and differs depending on the type of friendship network configuration employees operate in.

## Friendships breed success

Colleagues who develop high-trust friendships in the workplace enjoy manifold career and performance benefits. Friendships give employees access to insider information; they facilitate workplace collaboration, and create opportunities for influence. Studies show that workplace friendships facilitate productivity, employee retention, job satisfaction, job involvement, team cohesion, and other positive outcomes including personal growth and emotional support. Simply put, friendships boost an employee's chances of success.

At the same time, business friendships are particularly difficult to manage. They operate in a context of competing obligations: that of the openness and honesty of friendship and that of the need for discretion and loyalty to work teams and managers. The work environment can easily undermine the trust within workplace friendships.

We can see the undermining effect of the workplace on trust most clearly when employees have friendships spanning two or more friendship groups or cliques. In the literature, we call these employees "brokers" between cliques, and they are understood to be faced with unique challenges. Each friendship group of which the broker is a part expects to be given priority when it comes to gossip and ▶

*"Friendships in the workplace are one of the most powerful assets an employee can have."*

# Why trust in the workplace matters and how to cultivate it *(continued)*

By **Stefano Tasselli and Martin Kilduff**

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advice. Brokers must overcome the appearance of ambiguous loyalties. They run the risk of scepticism from others as to their motives. In each clique, the broker is expected to be honest and open, to share confidences, and to keep disclosures confidential.

So what determines whether or not an employee will successfully manage this potential for mistrust? A key question in our research is how people with different personality traits – specifically those of flexibility and verbal expressiveness – manage the potential mistrust inherent in multiple insider roles.

ker role require flexibility: someone who can adjust themselves to different people and situations. Individuals who demonstrate this ability (the high self-monitors) are best able to maintain trust within multiple groups. Individuals who fail to detect and adjust to different interpersonal needs within various groups are far more likely to lose trust.

Employees who are less flexible however (the low self-monitors) are more likely to win the trust of colleagues when the friendship structure involves a single clique. The expression of authentic attitudes

People high in blirtatiousness are easier to get to know – but they are also seen as more likely to share confidential information, and to fail to display discretion. Employees who are part of multiple friendship groups and who talk uninhibitedly about sensitive information quickly lose clique members' trust. Low blirters are more likely to be trusted with confidential information, therefore making them a better fit for the requirements of a brokerage role.

High blirters who are members of single cliques, on the other hand, have the opportunity to build trust through the transparency of their frequent communication with clique members. Their friends are likely to appreciate their spontaneity, and their tendency to speak their mind.

*“Friendship in a work setting is **incredibly important** both for an employee’s personal growth and for their productivity.”*

To find out, we studied two groups: 126 young professionals and 75 hospital professionals. We discovered that to be trusted, your personality – and, more specifically, the extent to which you are flexible and verbally expressive – must match your position as either a broker or a member of a single friendship group.

## **Flexible brokers**

People respond differently to the demands of being members of multiple cliques – and our research confirms that some people are a better fit for it than others. The demands of a bro-

ker and behaviours with little regard for impression management is regarded favourably within a single group of like-minded individuals.

## **Express less to win trust**

Another measure of an employee's fit as a broker is the extent to which they are verbally expressive. Some people tend to express themselves as soon as a thought occurs to them, communicating thoughts, feelings and attitudes immediately and without filtering. We call these individuals “high blirters”, while low blirters are slower and more inhibited when responding to others.

## **Investing in building trust**

Our research shows that individuals whose friendships span cliques are likely to be trusted to the extent that they exhibit a diplomatic personality style that combines a flexible presentation of themselves with a cautious revelation of their beliefs, attitudes and feelings. For employees whose friendships are within a single clique, competing pressures are less evident. But a personality style that combines low self-monitoring and high blirtatiousness is most likely to win colleagues' trust in a non-broker friendship network.

Friendship in a work setting is incredibly important both for an employee's personal growth and for their productivity. These friendships are par-



ticularly demanding, however, with friendship obligations likely to conflict with the organizational norms of discretion and neutrality – and nowhere more so than for employees whose friendships are across more than one friendship group.

Managers would do well to keep in mind, however, the potentially important role of these “friendship brokers” in an organization. Among the many advantages they offer is their potential to bring different departments or teams closer together and to increase knowledge sharing, which also stimulates innovation. Management should therefore encourage individuals who operate as “brokers” through

shout-outs at department meetings and commendations during performance evaluations.

As for individuals who operate as friendship brokers – they should be aware that being a diplomat and a go-between comes with a certain degree of risk. If they do not have the versatility of personality required to match the role and cannot be discreet and careful with their words, they may end up being the object of distrust across multiple groups. ■

**This article draws its inspiration from the paper *When Brokerage between Friendship Cliques Endangers Trust: A Personality-Network Fit Perspective*, written by Stefano Tasselli and**

**Martin Kilduff. Published online in the *Academy of Management Journal*, July 21, 2017 and now in press. DOI: <http://dx.doi.org/10.5465/amj.2015.0856>**

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# How independent research can improve investment decisions

By *Egemen Genc and Marno Verbeek*

**Independent research that expands the information set to include qualitative elements can help investors make better investment allocation decisions. This is one of the central findings explained in a recent paper, which attempts to pin down the influence of qualitative ratings awarded by the independent fund analysis firm Chicago-based Morningstar on the perception of any given individual fund.**

Morningstar launched a new set of analyst ratings in 2011, partly to answer the demands for improved research with respect to future mutual fund performance. Morningstar's analysts combine qualitative, research-based information with quantitative, numerically based analysis to generate a composite rating of a fund's prospect to provide superior risk-adjusted return over the long term. The analyst conducts a thorough analysis of the fund across five pillars (People, Process, Parent, Price and Performance), which Morningstar believes to be crucial for predicting future performance.

These ratings summarise the outlook of its analysts for each rated fund using a five-tier scale with three positive (recommended) ratings of Gold, Silver, Bronze, a Neutral rating and a Negative rating. The analyst rating is freely available on Morningstar's website while the corresponding analyst report can only be accessed by paying a subscriber fee. Subsequent to the initial rating, Morningstar analysts monitor rated funds on an ongoing basis and periodically provide additional analyst reports, which may (or may not) lead to a change in the analyst rating. Additionally, any time there are material changes to a fund (eg, a change in the management team), the analyst initiates a new review of the fund's rating.

## Fund performance

Returning to our research, we found evidence that the new rating system identifies funds that outperform peer funds by a clear margin. Moreover, we found that an investor who follows a



Morningstar, Inc is one of the most highly regarded investment analytic houses in the world. Its brief corporate history on its own website shows that it was launched in Chicago on 16 May 1984. It describes itself today as a leading provider of independent investment research in North America, Europe,

Australia, and Asia. The company offers an extensive line of products and services for individual investors, financial advisors, asset managers, retirement plan providers and sponsors, and institutional investors. It provides data and research insights on a wide range of investment offerings.

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naive (equal-weighted) strategy of investing in a portfolio of Gold-rated funds would earn significantly higher returns than would be obtained by investing in Not Recommended funds.

While there is a substantial literature that examines analyst recommendations of individual stocks, there is little research available that assesses the impact of forward-looking ratings of mutual funds. In our paper, we investigate Morningstar's qualitative, forward-looking analyst ratings, which reflect independent analysts' expectations of a fund's future performance. We find relatively higher flows to funds receiving higher ratings, suggesting that the average investor values the analyst's subjective views when allocating their wealth.

Earlier academic research largely suggests that mutual fund investors either rely heavily on measures of historical fund performance, which lead investors to chase returns or follow recommendations from brokers representing the funds.

Unfortunately, quantitative measures of historical performance are backward looking and contain little information regarding future performance. Broker recommendations also offer little value to investors, especially after taking fees and expenses into account.

Our aim in the paper is twofold. First, we explore how analyst ratings affect the capital allocation decisions of fund investors and how this relation changes with fund characteristics previously shown to affect flows, including

of mutual fund information should facilitate broader investor adoption of these ratings. Unlike broker advisers, Morningstar operates a business model in which analysts do not prospect for potential customers through advising, nor do funds commission their research. This means that there is no obvious incentive mechanism that would compromise the ability of its fund analysts to be impartial.

Second, we assess the value of these ratings as a criterion for identifying which mutual funds are expected to have relatively higher future performance. Backward-looking measures such as star ratings are documented to have limited value in terms of selecting better-managed funds. Morningstar's stated objective is to identify funds with the potential to outperform their peers on a risk-adjusted basis over the long term (ie, a full business cycle). Given that many retail investors follow Morningstar's research, it is important to understand whether the forward-looking analyst rating contains information with respect to a fund's future performance.

We next examine how variation in Morningstar's star ratings, also a strong predictor of fund flows, affects the relation between analyst ratings and fund flows. We find that additional flows accruing to Gold-rated funds are higher when funds have star ratings of three stars or less; flows to Not Recommended funds are lower when funds have star ratings of four or five stars.

These results are consistent with investors responding to the analyst rat- ▶

*“...we found evidence that the new rating system identifies funds that outperform peer funds by a clear margin.”*

The numbers involved are large. Household investments in mutual funds represent approximately 89 percent of the US\$16 trillion in assets under management at the end of 2016. With approximately 8,000 mutual funds in existence, the question of how investors choose to allocate wealth across this set of mutual funds is a topic of ongoing debate.

the widely followed star ratings. The qualitative nature of these ratings has the potential to expand the information set of uninformed investors as the ratings summarize both tangible and intangible information pertaining to the rated funds into a relatively easy-to-understand metric.

Further, Morningstar's reputation as a well-known, independent source

ings, and even more so when the ratings offer a contrary view to the star ratings. If investors disproportionately allocate more capital to funds with star ratings of four or five stars as shown in the literature, the Gold rating may result in increased investor interest in funds that have relatively low star ratings.

In contrast, investors who remain in poorly performing funds are less information-sensitive. If more vigilant

agerial characteristics documented in the literature. In comparison, Silver or Bronze ratings have no predictive power for fund performance. These results suggest that funds with the highest analyst conviction fulfil Morningstar's objective of identifying superior funds, but not all analyst ratings are equally informative.

Our results are important for investors seeking to maximise return on their investments and for fund man-

of fund managers are compensated with a fixed percentage of assets under management. ■

**This article draws its inspiration from the paper *Going for Gold: An Analysis of Morningstar Analyst Ratings*, written by Will J. Armstrong, Egemen Genc, and Marno Verbeek, and published online in *Management Science*, 22 December 2017. DOI: <http://dx.doi.org/10.2139/ssrn.2419669>**

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“Our results are important for investors seeking to *maximise return on their investments* and for fund managers trying to *maximise assets under management*.”

investors have already withdrawn capital from funds with relatively low star ratings, a negative signal such as receiving a Not Recommended rating is likely to have less further impact on the flows of these funds relative to funds with higher star ratings.

Establishing a robust flow response to funds with high analyst conviction, we next assess if the analyst ratings contain information about the rated funds' future performance. We found that Gold-rated funds outperform Not Recommended funds by 1.2 per cent per year on a risk-adjusted basis. This finding is robust to controlling for performance predictors and various man-

agers trying to maximise assets under management. Given the proliferation of investment advice from various sources, investors should be interested in knowing the reliability and value of analyst recommendations.

Understanding the value of the recommendations is especially important since traditional backward-looking measures have little power to predict superior future performance. Further, the impact of analyst ratings on future fund flows may incentivise fund managers to improve in the key areas that affect their fund's analyst ratings. This is important in an industry in which more than 90 per cent

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# The benefits of combining drones and trucks for deliveries

By **Niels Agatz**

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**With next-day delivery and even same-day delivery becoming standard, companies like Amazon and Alibaba are experimenting with drone technology to quickly get packages into the hands of customers. Early testing focuses on the practical question of how this can be done, but we took a step back to ask whether it is worth doing at all. Using a combination of a traditional delivery truck and a companion drone, our model says yes.**

Delivery trucks can cover a lot of ground and carry a lot of packages. Drones are light, unrestricted by traffic, and soon won't need a dedicated human operator. Combine the two and the result is a complementary delivery unit that can reduce the total route time by an average of 30-38 per cent compared to using a truck alone.

We developed a scalable model, published in our paper, *Optimization Approaches for the Traveling Salesman Problem with Drone*, that calculates the best possible route a delivery truck can take to allow both the truck and its drone to deliver packages to customer locations. The solution shows

which customers are served by the drone and which ones by the truck. The wait times required by either the truck or the drone for their companion to rejoin them are factored in, and real-life information, like the limitations of a specific model of drone, can be included as it presents itself.

## Why add drones?

Amazon was my first inspiration on this question. They've been testing drones for years and even filed a patent related to using lamp posts as drone docking stations. But later I found a reference to research conducted by the University of Cincinnati, working

with a company that builds electric trucks. They were specifically looking at the problem of combining the use of delivery drones with regular trucks, but from an aeronautical engineering point of view. These engineers mainly focused on the "how" questions: 'How do I get a drone to land on top of the truck; how do I load the package on the drone; how can a drone ring the doorbell?'

My co-authors and I became more interested in the "why" questions. Sure, using drones to deliver packages is an interesting idea – and it's certainly fun to play with drones to test the theories – but what does it really mean for someone who has to perform these deliveries; what are the practical benefits (if any) for a provider who needs to coordinate the drone, truck, customer and delivery?

One of the biggest benefits to a delivery provider is saving time. In all of the computer experiments we ran, the truck/drone combination showed a significant time saving over using a truck alone. When our customers were randomly scattered, the truck/drone pair was 30 per cent faster than a truck alone. And when our customers were grouped in one or two areas – particularly relevant in cities with high-density housing – with just a few customers scattered outside the main group, our drone was able to deliver to the outlying customers while the delivery driver worked through the main cluster. Here we reduced the total time taken by even more: 38 per cent faster than the same route using only a truck. ▶

*“One of the biggest benefits to a delivery provider is saving time. In all of the experiments we ran, the truck/drone combination showed a significant time saving over using a truck alone.”*

# The benefits of combining drones and trucks for deliveries *(continued)*

By **Niels Agatz**

In short, across the board we could eliminate a third of the time normally spent delivering packages across the “last mile”.

## Classic problems

The “last mile” is the distance between the final package depot and the customer. This small but significant distance has always been the most expensive part of any delivery. Planning the logistics of moving packages from the supplier to warehouses and delivery depots is relatively easy – there are many packages and reliable patterns that allow for predictions. But the delivery of a single package from the last transport hub to a customer’s hands can account for more than 25 per cent of the total cost of delivery. Other factors like road congestion, pollution, and the potential danger to a delivery driver constantly on the road add to the urgency of reducing the resource load of this last mile.

The travelling salesman problem is a classic problem in applied mathematics. Traditionally a travelling salesman has multiple cities or customers to visit. The main challenge

is to find the optimal sequence of these visits to spend the least possible amount of time, or travel the smallest possible distance. The travelling salesman is a good starting point to study truck-and-drone routing, as it is a fundamental underlying problem in many real-life routing problems. Even if you have multiple vehicles to coordinate, the routing problem of each individual truck and drone pair can be represented by the travelling salesman problem.

## A flexible model

We didn’t include real parameters as there simply aren’t any yet. This field is so new that no one is really using drones in delivery (with a couple of notable exceptions: DHL in Germany already uses a drone to deliver medical supplies to one of the islands in the North Sea, and China uses drones to deliver goods to isolated mountain villages).

Without real-life usage there is no data on how, for example, a drone will perform if you are delivering to a high-rise building. But the model we developed can take these factors into



account. Equally, other details like the type of truck, the type of drone, the speed of the vehicles is simply input.

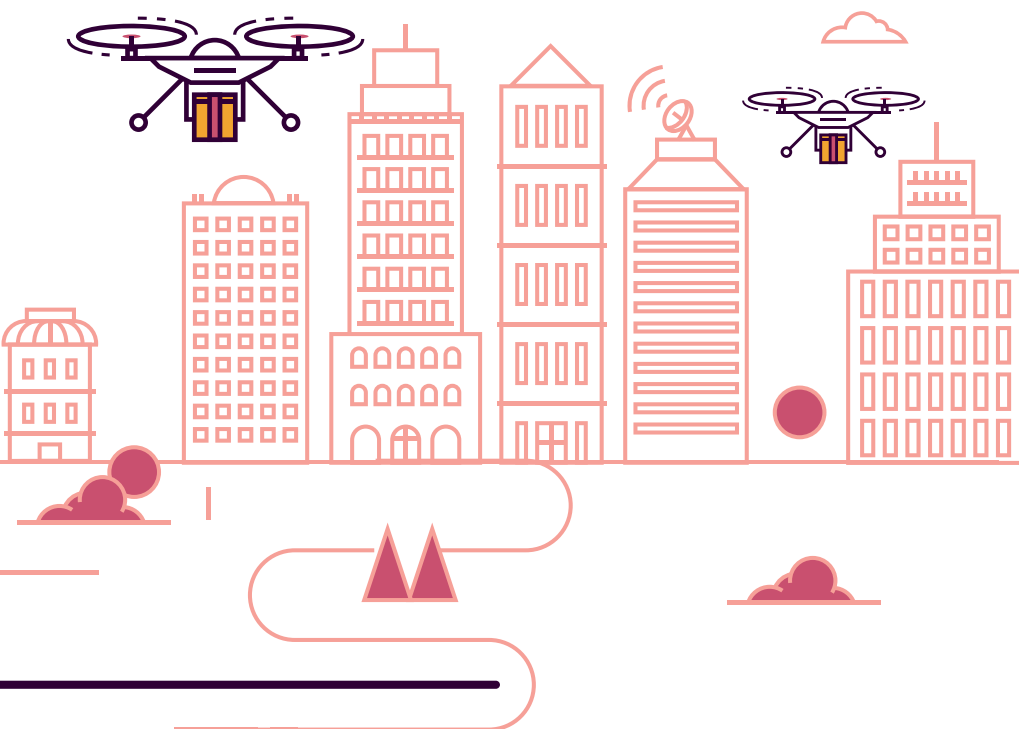
## Practical uses

To all intents and purposes this model is not theoretical – you could incorporate it in practical route planning tools to begin using drones.

Delivery companies have been using tools like route-planning software for years. In some cases this produces interesting results. For example, the delivery company UPS has used their software to develop and refine the “right turn only” method that, in countries that drive on the right,

*“To all intents and purposes **this model is not theoretical** – you could incorporate it in practical route planning tools to begin using drones.”*





eliminates all but the most necessary left turns. This unusual approach has saved UPS between US\$300-400 million each year in fuel, personnel and vehicle running costs, as well as the human cost of statistically more dangerous left-hand turns.

But there are so many practical limitations on the use of drones (safety, privacy, air space) that even Amazon's tests sometimes seem to be designed more for publicity than practicality.

While there are still many practical and legal hurdles to be overcome before drone delivery becomes a reality, the model we developed works equally well for other robotic delivery

options that might be easier to deploy. Right now, for example, a company called Starship is testing the use of droids to deliver parcels in various cities in the United States. The droids move at human speeds and use the pavement rather than the road or the skies.

Obviously it makes no sense to send a walking-pace robot out from a distant depot to deliver goods; but combine a few of these droids with a delivery truck and our model shows a significant potential increase in the efficiency of the delivery route; an efficiency gain that could be implemented tomorrow. ■

**Optimization Approaches for the Traveling Salesman Problem with Drone**, written by Niels Agatz, Paul Bouman, and Marie Schmidt. Forthcoming in *Transportation Science*. DOI: <https://doi.org/10.1287/trsc.2017.0791>

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# Online product reviews and whether to believe them

By *Christilene du Plessis*

**Web-based user-generated content represents a potential goldmine for marketers trying to sell their products to the largest possible number of potential buyers. Getting previous consumers to give their products the online thumbs-up may seem like a guaranteed winner, but such a promotional strategy comes at a cost – a monetary cost and also the risk that paying consumers to deliver positive reviews may backfire on the grounds of credibility.**

In a consumer world where the internet is both the root of and the solution to the problem, finding accurate and reliable information before making a decision to purchase a product or service has never been more challenging. Whilst the web offers advertisers a plethora of sales opportunities and consumers unrivalled knowledge of the best buys on the market, using the web intelligently and believing what one reads is another matter.

Consumers are less easily fooled by the hard sell as pushed by firms themselves and more open to the objective experience and opinion of their fellow buyers. In response to this, sellers are giving increased space and visibility to customer feedback. The US-based Yelp platform is just one example, based upon the 26,000 reviews currently published per minute on the site. The danger is that there is no 100 per cent guarantee of product or service providers being showered with praise. How, then, can a firm entice glowing reviews without seeming to pressurise customers into publishing comments that readers will quickly see through?

## The consumer psyche

Research into the social influences that make the consumer mind tick dates back to the 19th century and was generated primarily due to an interest in advertising and its impact on people. Until recently, investigation of this very modern-day phenomenon has so far concentrated just on individual relationships, for example the dynamic between a seller and the consumer who writes a review or between the review and the reader. However, it is time that the two relationships were viewed in combination, not least due to the climate in which reviews are now solicited, published, read and critiqued.

Firms have growing recourse to incentive schemes in order to encourage consumers to contribute to product promotion, with payment coming in the form of coupons, rebates, free samples, and monetary payments, among other methods. This can have a knock-on effect on the degree of confidence with which reviewers write. In addition, review readers are increasingly web-savvy, making them more likely to take a critical distance and question why certain reviewers are so effusive in

their praise. In an attempt to counter this underlying distrust by readers, firms therefore “go transparent” by flagging clearly when reviewers have contributed as part of an incentive programme (think Amazon Vine, for example, where it is explicitly mentioned at the beginning of any consumer feedback provided in the context of the scheme). Whilst this honesty-first policy may work in some cases, there also exists a major element of risk –





*“...as many as 88 per cent of consumers rely upon product reviews when considering the wisdom (or otherwise) of a purchase.”*

schemes it is essential that marketers understand the factors that will impact the response of review readers. Generally speaking it is neither absolute positivity or exhaustive length and detail that will be trusted by readers. A sense of balance is key, as well as the legitimacy of the writer's opinion as perceived by the reader. These factors are key in lowering the chances of a reader backlash to a review deemed either overly biased or simply unconvincing and uncertain. A recent multi-part research project has sought to understand the full chain of events, from the conditions in which the reviewer is writing through to the final reaction of the reader in order to ascertain if some firms are indeed spending money for nothing.

### **Cost of uncertainty**

The first stage of the study focuses on the uncertainty caused within some

the risk of a review reader backlash that will result in feedback not being taken seriously.

### **Money for nothing?**

According to recent statistics, as many as 88 per cent of consumers rely upon product reviews when considering the wisdom (or otherwise) of a purchase. Faced with this growing demand for sales content generated by consumers (rather than the selling by firms

themselves), incentive programmes have been set up in the hope that by ploughing budget into obtaining good reviews, sales will be boosted for a sizeable ROI. Amazon.com is just one example of this rising trend, with the percentage of its incentivised reviews growing from two per cent of all reviews to 50 per cent over the period 2012-2016.

In order to get value for the money they will invest in such incentive

# Online product reviews and whether to believe them *(continued)*

By **Christilene du Plessis**

review writers, based upon the degree of financial compensation received and the resultant effect on the reviews produced and the reception from readers. Real-life testing and reviewing of three products (a pair of headphones, an online video game, and a brand of yogurt) with differing levels of payment and involving a participant population of 600 Dutch university students and 300 US online panel participants, examined how the writers considered the legitimacy of their own opinion in relation to the reward they received. Participants were informed in advance how much they would be paid, as is the case in real-life review scenarios. A clear tendency for lower-paid reviewers to question the legitimacy of their own opinion and write more uncertain

product reviews. This invariably takes the form of auxiliary information about the reviewer and/or the means by which their review was produced. Such a transparency policy would appear risky but what the research project aimed to establish was the impact of the critical reader mind on the credibility of the incentivised review where clear indication is made that the writer was rewarded. Based upon data collected from Amazon.com covering 300 reviews of 10 products during the period April-May 2014 which were subsequently assessed by 5000+ Amazon Mechanical Turk participants, the study drew a fine but clear line between incidental and integral uncertainty, based in part on the degree of incentive disclosure.

deemed integral or incidental to judgment formation. Using a field study and two experiments, the research shows that disclosure-induced uncertainty about reviewer trustworthiness deemed integral to judgment formation, leads to lower product evaluations based on the incentivised review. However, when uncertainty is judged incidental to judgment formation, product evaluations are unaffected by incentive disclosure.

Paying consumers to provide positive product or service feedback requires the perfect balance – incentivising to an extent that writers feel confident enough in themselves to produce reviews that inspire confidence in readers without coming across as paid lip service that should not be trusted. In a web-based world where users and consumers are arguably the most valued advertising mouthpieces, it is more important than ever to not overstep the line between gaining good press and buying unconvincingly good publicity. ■

*“Paying consumers to provide positive product or service feedback requires the perfect balance...”*

reviews was observed. This was then backed up by an additional step in the research, where readers then assessed the reviews in order to establish the knock-on effect that this uncertainty produces from the reader perspective.

## The critical reader

The second dimension to the study introduced the notion of incentive disclosure, an increasingly prevalent reality in the world of online customer

## An important distinction

The study concluded that readers with doubts as to the ulterior motives behind a review question the relevance of their doubt for judging the reviewed product. In short, in contrast to the common belief that uncertainty regarding the trustworthiness of a reviewer will always decrease persuasion, the role of uncertainty in decision-making proves more nuanced and depends on whether uncertainty is

**This article draws its inspiration from the PhD thesis *Influencers: The Role of Social Influence in Marketing*, written by Christilene du Plessis and published as part of the ERIM PhD Series Research in Management. It can be freely downloaded at**

**WEB** <https://repub.eur.nl/pub/103265>

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