Developing A New Lens: Introducing Path Dependence Theory to Explore the Facial Stereotype in the Online Outsourcing Market

Yuting Jiang
Department of Information and Service Economy, Aalto University School of Business,
yuting.jiang@aalto.fi

Follow this and additional works at: https://aisel.aisnet.org/pacis2022

Recommended Citation
https://aisel.aisnet.org/pacis2022/245

This material is brought to you by the Pacific Asia Conference on Information Systems (PACIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in PACIS 2022 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.
Developing a New Lens: Introducing Path Dependence Theory to Explore the Facial Stereotype in the Online Outsourcing Market

Completed Research Paper

**Yuting Jiang**  
Department of Information and Service Economy, Aalto University School of Business  
Helsinki, Finland  
yuting.jiang@aalto.fi

**Abstract**

The online outsourcing market has attracted more and more people to join. However, clients’ facial stereotypes lead to biases in fast-paced hiring. So far, the dominant explanations for online labor market stereotypes have been limited to heuristic theories, lacking a theoretical framework that can systematically cover the complete path of stereotype generation, development, and elimination. This study aims to construct a two-stage conceptual framework of stereotype path dependence in online outsourcing markets (OOM). First, construct a path-dependence trigger mechanism based on the contextual characteristics of the OOM. Second, develop the self-reinforcing cycle of stereotypes by combining the hiring mechanism and characteristics of the OOM. We propose a two-stage intervention approach based on the constructed theoretical framework. Specifically, platforms can control the triggers of stereotype path-dependence by reducing system uncertainty, complexity, and balancing power structures or avoid stereotype reinforcement by recommending freelancers who are contrary to employer preferences.

**Keywords:** Path dependence, facial stereotype, trigger characteristics, self-reinforcing cycle, two-stage intervention approach

**Introduction**

Online Outsourcing Marketplace (OOM) is a popular online gig service system that aims to globalize the gig economy by outsourcing clients’ tasks to employees around the world (Hong and Pavlou 2017). The online format, with no geographic constraints, greatly improves access to the freelance market. Especially with the spread of the novel coronavirus, large portion of the world’s population worked from home, making people more dependent on the online labor market (Etheridge et al. 2020). But the online hiring system faces some serious problems. Many freelancers don’t get equal work opportunities because of employer’s stereotypes. A survey found that about 520000 freelancers on Upwork did not get any job, while about 70,000 of the freelancers who completed at least one assignment earned less than $1 (Green 2018). The unequal opportunities for freelancers stem from a combination of factors, one of which may be employer’s stereotypes. Although freelancers are not required to disclose their personal information to protect their privacy and security, the OOM requires freelancers to disclose their portraits to alleviate the trust crisis among employers caused by information inequality in online systems. In fact, personal portraits imply a lot of personal information, including gender, race, etc., which can lead to potential facial stereotypes and hiring bias (Atwater et al. 2004; Ndobo et al. 2018).

Researchers have confirmed facial stereotypes in hiring decisions in traditional labor markets (Zebrowitz et al. 1991), and studies have shown that people spontaneously and rapidly infer personal features from faces (Menegatti et al. 2021). The inference is closely related to important decision outcomes, such as the
selection and compensation of leaders (Fruhen et al. 2015). Due to the mediated nature of online employment environments, facial stereotypes in them have attracted widespread attention. In online hiring systems, sellers’ profile influences consumer decisions through perceived attractiveness and trustworthiness (Ma et al. 2017), Jaeger, et al. (2019) also indicated that people’s decisions depend on profile photos in OOM. In reviewing research on hiring bias in the OOM, we found that most of the theories currently used to explain stereotypes are heuristic, and a few studies use other theories, such as Cost theory and Trust theory (Lin and Viswanathan 2016). However, these theories are only used to explain the reasons for the formation of stereotypes and do not embed the complete process of stereotype formation, development, and reduction into a systematic theoretical framework for discussion. Hiring bias in OOM is a dynamic development process, but these theories do not provide staged countermeasures for reducing hiring bias.

In this paper, we introduce path dependence theory as a tool to understand stereotypes in the OOM. This theory was initially used to explain the physics-like inertia that exists in the process of technological evolution or institutional change, referring to the fact that once a path is taken, whether the outcome is "good" or "bad", it will continue down a locked road. The force of inertia will make this choice self-reinforcing and difficult to change. In the case of stereotypes, stereotypes are strongly associated with a reluctance to change. Some studies have shown that the strength of the original attitude can express initial inertia (Yum and Park 1990). If people have more explicit initial ideas about a social group, they are more likely to reject new information that contradicts existing beliefs, making it difficult to change attitudes. This conceptual similarity gives us a reason to believe that path dependence can be used to explain stereotypes. Other studies have indicated that path dependence exists in the online hiring market (Lukac and Grow 2021). Specifically, the reputation system makes the recruitment decision path-dependent. The recruitment decision made by an employer at a certain point in time will affect workers’ reputation, thus affecting the future hiring decisions of other employers. Nonetheless, no studies have attempted to apply the holistic framework of path dependence to stereotypes in online markets, thus providing us with an opportunity to systematically understand the process of stereotype formation and development from new perspectives. Most importantly, if path dependence is identified, then discrimination can be partially addressed through breaking the formation of stereotype paths.

Based on this process, we identify forward two research questions:

1. What are the mechanisms by which stereotype path dependence arises and develops in the OOM?
2. How does the conceptual model of stereotype path dependence provide countermeasures for mitigating hiring discrimination?

We posit that this is the first time when the overall framework of path dependence is used for studying stereotypes in the OOM. The theoretical framework developed in this paper could cover the entire process of stereotype generation, development, and reduction. It also systematically provides countermeasures to mitigate hiring bias in the OOM. We developed a two-stage intervention approach based on this conceptual framework, embedding stereotype mitigation strategies within a theoretical framework. The establishment of this theoretical framework includes a comprehensive summary of the characteristics of the online employment market, a mapping study of the OOM environmental characteristics and path-dependent environmental characteristics, and a dynamic study of the mechanism of stereotype development in the online environment.

In the next section, we summarize the theoretical background, presenting an overview of the existing literature on facial stereotypes and characteristics of the OOM, and introduce the path dependence theory and self-reinforcing effect. Then, we elaborate on the influence of contextual characteristics of the online outsourcing platform on stereotype path dependence on three aspects: the power structure, uncertainty, and complexity. After constructing the self-reinforcing cycle in the OOM, we combine the characteristics of the formation process and a two-stage intervention method was developed on this basis. Then, we discuss the impact on theory and practice. We conclude by highlighting the limitations of this study and outlining avenues for future work.
Research Background

Facial Stereotype

The face reveals a lot of information, such as gender, race, age, whether one wears glasses, attractiveness, and emotional state. Our judgments of a person’s personality, ability, and cognition are usually based on the reasoning and expectations of facial features (Todorov et al. 2015). Several studies have shown that faces are closely related to social decision-making behavior (Duarte et al. 2012; Olivola et al. 2014). People’s reasoning based on facial features will affect the formation of impressions from three dimensions: trustworthiness, dominance, and attractiveness, and these impressions will affect the outcome of decision-making. Decision-making results are largely affected by the decision-maker’s ability to make accurate judgments and expectations of others. Scholars have found that such expectations and judgments are not always objective and accurate, and the decision-making process is affected by some implicit facial cues (Chan and Wang 2018). Specifically, after perceiving facial features, people will subconsciously classify groups, such as female groups and male groups, Asian and African groups, youth groups and elderly groups, etc. These classifications will allow people to associate the evaluation of faces with the corresponding group characteristics, resulting in stereotypes. The Stereotype assigns different characteristics to members of a particular social category and thus creates different expectations of them. We summarized the stereotype research of different facial features, including gender, age, race, attractiveness, whether to wear glasses, and expression status below (Table 1).

<table>
<thead>
<tr>
<th>Type of Stereotype</th>
<th>Stereotype</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender Stereotype</td>
<td>Men are considered to be more capable of problem-solving, while women are considered to be more capable of communicating (Atwater et al. 2004).</td>
</tr>
<tr>
<td>Racial Stereotype</td>
<td>Native-born are considered to be more suitable for positions with high prestige, while positions with low prestige are more favored by minorities (Ndobo et al. 2018).</td>
</tr>
<tr>
<td>Age Stereotype</td>
<td>Older workers are stereotyped positively in terms of warmth, such as reliability and loyalty, but negatively in terms of competence, such as technical competence and adaptability (Krings et al. 2011).</td>
</tr>
<tr>
<td>Attractive Stereotype</td>
<td>Attractive people are considered to have higher job potential and career success rate (Yates et al. 2017).</td>
</tr>
<tr>
<td>Glasses Stereotype</td>
<td>People who wear glasses get higher expectations in terms of intelligence and credibility, but lower expectations in terms of attractiveness (Leder et al. 2011).</td>
</tr>
<tr>
<td>Smile Stereotype</td>
<td>Smiling has a positive effect on social interaction, but a negative effect on professional skills (Glikson et al. 2018).</td>
</tr>
</tbody>
</table>

Table 1. The Relationship Between Stereotype and Skill Expectation

Online Outsourcing Market (OOM)

Online Outsourcing Marketplace (Online Labor Marketplace) is an online gig service system that aims to globalize the gig economy by outsourcing clients’ tasks to employees around the world (Hong and Pavlou 2017). Upwork and Freelancer are estimated to be the largest OOM platforms in the world, with 17 million and 31 million registered users worldwide (Roy and Shrivastava, 2020). The OOM involves many types of work. Upwork, for example, has 12 major categories, including Accounting & Consulting, Customer Service, Data Science & Analytics, Design & Creative, Engineering & Architecture, IT & Networking, Legal, and Sales & Marketing.
Operating mechanism

The OOM is highly digital. The users’ behavior on the platform will be recorded, and these data will be provided to the platform’s recommendation system to intelligently recommend freelancers for clients. Meanwhile, these data will be reflected on the freelancer’s homepage through the reputation system for clients making hiring decisions. To alleviate the employer trust crisis caused by information asymmetry, the OOM provides a complete freelance reputation system for employers to make decisions. Take Upwork.com as an example, where information such as freelancers’ work history on the platform, the number of jobs completed, the job success rate, and employer feedback will be reflected in the reputation system. Besides, in the case of Upwork.com, users can log in as either a client or a freelancer. Freelancers are required to upload their personal portraits and to complete personalized information, such as skills, hourly charges, etc., and then wait for the client’s selection.

As far as the client is concerned, there are two ways to choose the right freelancer. One is to rely on the recommendation system. Upwork’s recommendation system conducts algorithmic analysis based on two parts of information: personalized information filled by freelancers and information from the reputation system recorded by the platform, to recommend suitable freelancers to clients. The second method is to rely on filters to select desired freelancers. The filter contains many attribute tags, such as hourly fee, income, professional field, etc. Employers can select these tags to filter freelancers according to their own preferences. After conducting an online evaluation the client will send an interview invitation to those freelancers whom they have the intention to hire. At this stage, the details of the task, including salary and job requirements, will be discussed. Finally, the freelancer receives the employment contract and starts working. We drew the hiring flowchart on Upwork.com (Figure 1).

Hiring Bias in Online Outsourcing Market

Several studies have focused on hiring bias in the OOM (Table 2). The categories of bias studied mainly include gender bias, home bias, and racial bias. Most of these studies use empirical research methods to explore the employment bias in the OOM, and there are few theoretical studies. In addition, the theoretical support of hiring bias is very similar. Among the five examples we have summarized, four of them use heuristic theories to explain stereotype and hiring bias. Heuristics refer to methods used by decision-makers to quickly obtain clues from complex decision information to simplify decision-making (Chan and Wang 2018). This approach can lead decision makers to rely on irrelevant attributes (Arvey and Terpstra 1977), resulting in systemic bias (Tversky and Kahneman 1974).
We found that the current theories used to explain the stereotype are limited to heuristic theories, which are only used to explain why stereotypes are formed. In addition, this theory lacks attention to the context, but stereotype in online and offline environments may have different manifestations due to different contextual characteristics. Therefore, there is no theoretical framework embedded with contextual features to completely conceptualize the formation and mechanism of stereotype.

Characteristics of Online Hiring Market

We summarized the hiring characteristics in OOM. In the OOM, employers’ hiring decisions are based on information provided by platforms and freelancers. However, it is difficult to accurately assess freelancers’ attitudes, personality characteristics, and work enthusiasm (Todorov et al. 2015). In addition, there is a serious information asymmetry problem in the OOM, which is caused by two reasons. First, because it does not rely on geographic relationships, online hiring cannot carry out face-to-face communication, which makes it impossible for employers to verify the authenticity of information (Hong and Pavlou 2017). Second, the OOM lacks a quality assurance mechanism, that is, the platform only requires the freelancer to complete the task, regardless of the quality of completion (Asker and Cantillon 2018). Another feature is that the information of freelancers on online outsourcing platforms changes in real-time. In addition, some index data such as the cumulative number of jobs they obtained has a significant relationship with the length of registration time. However, the online hiring system only displays the accumulated values of these indicators, which makes it hard for the decision-maker to estimate the real work level without the control of the registration time.

To balance the inherent problems of the online model, the market and freelancers will provide as rich decision-making information as possible (Uhlmann and Silberzahn 2014), including personalized data and a reputation system containing multiple evaluation index data, making the decision-making information on the OOM particularly complex. Freelancers tend to provide positive personal information, and in the same category of tasks freelancers’ information has a high degree of homogeneity (Radkevitch, Heck and Koppius, 2006), making it difficult for clients to perform decision analysis. Another characteristic is that there is no unified assessment standard within the OOM. On different online outsourcing platforms, freelancers have different types of information, which makes it difficult for the decision-making system to meet consistent conditions. In the gig economic market it is thus difficult for employers to formulate a unified evaluation system and evaluation standard, which makes unstructured interviews difficult to perform, thereby increasing the complexity of decision-making. Structured interviews could help standardize the hiring process, thereby eliminating the influence of some subjective factors, whereas unstructured interviews can exacerbate the production of stereotypes and biases in hiring decision-making processes (Bohnet 2016).

In the OOM, employers and freelancers often communicate one-to-one. Studies have shown that single-person evaluation is more likely to be affected by stereotyped thinking than multi-person evaluation process, resulting in employment bias (Hjalmarsson and Bindler 2018). Specifically, when multiple people conduct employment evaluations at the same time, personal subjective bias may be eliminated. This multi-person decision-making and discussion can help to improve the objectivity of employment. The power structure of many service categories in the online outsourcing market is asymmetric, which means that the number of buyers and sellers is quite different. The typical OOM hiring follows the reverse auction

<table>
<thead>
<tr>
<th>Type of Bias</th>
<th>Research Type</th>
<th>Theory</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender Bias</td>
<td>Empirical Study</td>
<td>Heuristic theory</td>
<td>(Chan and Wang 2018)</td>
</tr>
<tr>
<td>Gender Bias</td>
<td>Theoretical study</td>
<td>Heuristic theory</td>
<td>(Uhlmann and Silberzahn 2014)</td>
</tr>
<tr>
<td>Home Bias</td>
<td>Empirical Study</td>
<td>Heuristic theory</td>
<td>(Liang et al. 2018)</td>
</tr>
<tr>
<td>Home Bias</td>
<td>Empirical Study</td>
<td>Cost theory and trust theory</td>
<td>(Lin and Viswanathan 2016)</td>
</tr>
<tr>
<td>Race Bias</td>
<td>Empirical Study</td>
<td>Heuristic theory</td>
<td>(Pager et al. 2009)</td>
</tr>
</tbody>
</table>

Table 2. Hiring Bias in the Online Outsourcing Market
Path Dependence in Online Hiring Market

mechanism and is therefore buyer-led (Smart & Harrison 2003). We summarize the situational characteristics of the OOM in Table 3.

<table>
<thead>
<tr>
<th>Information characteristics</th>
<th>Presentation of situation characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy of decision information</td>
<td>Low</td>
</tr>
<tr>
<td>Stability of decision information</td>
<td>Dynamic</td>
</tr>
<tr>
<td>Types of information</td>
<td>Very Rich</td>
</tr>
<tr>
<td>Assessment Criteria</td>
<td>Inconsistent</td>
</tr>
<tr>
<td>Homogeneity of decision information</td>
<td>High</td>
</tr>
<tr>
<td>interview method</td>
<td>One-to-One, Unstructured</td>
</tr>
<tr>
<td>Information Asymmetry</td>
<td>Serious</td>
</tr>
<tr>
<td>Auction mechanism</td>
<td>Reverse</td>
</tr>
</tbody>
</table>

Table 3. The Situation Characteristics of Online Hiring

Path Dependence Theory and Self-reinforcing Mechanisms

Path dependence theory

Path dependence theory was originally used to explain the mechanism by which an inferior technology can be maintained (David 1985, 1986). Specifically, some choices or events will recur in later time (Dobusch and Schüßler 2013), and the choice becomes more fixed and difficult to change (David 1986), which is called the path-dependent process. The self-reinforcing mechanism drives the generation of this path (Araujo and Harrison 2002). This self-reinforcing mechanism is a key component of path dependence (Sydow et al. 2009), as well as a theoretical hallmark of path dependence (Koch et al. 2009). Path dependence is the result of a dynamic process dominated by one or more self-reinforcing mechanisms (Koch et al. 2009). A prerequisite for discussing whether path dependence exists in the hiring process of OOM is thus to explore the self-reinforcing effect of this context.

Path dependence is a process of dynamic decision-making. Sydow et al. (2009) divided the process into three stages and conceptualized the deductive development of each stage, as shown in Figure 2.

There is a certain contingency in the first stage of the path. At this stage, historical choices (such as stereotypes) will exert a slight constraint on decision-making behavior. The sign of the end of phase one is that some events or triggering factors lead to self-reinforcement, from which the second stage of dynamic evolution begins. A positive self-reinforcing cycle dominates this stage of the process. Specifically, after
many repeated decisions, the decision-making pattern is strengthened to form a stable decision scheme (the red line). At this stage, the range of options is significantly narrowed, but some other choices remain. Once the path is locked, a third stage is reached, in which choices are largely limited and dominated by past experience. In this state, there is a lack of consideration of alternative solutions, and the options for decision behavior become very narrow.

Pierson (2000) summarized several characteristics of the paths. The first is unpredictability. Most of the events in the early stage of path occurrence are random, which leads to the uncertainty of the result. Therefore, it is impossible to predict which final result will be reached, that is, it may reach the end of the second stage, or it may develop to the third stage to form a lock. The second is the lack of flexibility. Due to the accumulation of costs, the deeper the self-reinforcement process, the harder it is to abandon the original path and choose a new one. It is easier to change the path in the early stage of path formation. The third is non-ergodicity. The path is often caused by accidents, but the impact of these accidents will not disappear but will have a long-term impact on the future path. In many cases, when the path reaches the Phase 3 lock-in state, it is likely that it will not yield higher returns than the other options, so the entire path will be very inefficient.

Although the path-dependent theory is mainly used to explain technological evolution and institutional change in economic and political fields, some scholars have successfully transferred path-dependent theory to other research backgrounds. For example, Hjalmarsson et al. (2018) used path-dependent theory to explain and verify jury behavior and found that a previous guilty verdict significantly increased the chances of a subsequent guilty verdict. Auschra and Sydow (2021) introduced the path dependence theory to explain the stability of the health system. We posit that these examples introduced the path dependence theory to explain are influenced by habitual thinking and historical decisions. Since stereotypes also have the characteristics of being influenced by habitual thinking and historical habits, we have a reason to believe that path-dependent theory may explain stereotypes.

**Self-reinforcing Mechanisms**

The classifications of self-reinforcing mechanisms currently recognized by most scholars include coordination effect, complementary effect, expectation effect, and investment learning effect (Onufrey and Bergek 2015). The coordination effect refers to the utility of following the same behavior as others: the more choices people make in the same behavior as others, the more common benefits they can gain (Sydow et al. 2009). The complementary effect means that the provision of high-quality complementary products is conducive to market expansion and market attractiveness (Farrell and Saloner 1985), which in turn promotes the development of complementary products when there are more buyers. The expectation effect refers to modifying one’s own behavior based on the future choices of others (Dobusch and Schüßler 2013), which is similar to the coordination effect (Arthur 2016). It is important to notice that the expectation effect does not bring practical benefits, but only satisfies certain emotional needs, such as social belonging (Sydow et al. 2009). The investment learning effect refers to the original accumulated learning of technology or method, which is difficult to transfer to new technology or a new method for reuse (Dobusch and Schüßler 2013). In the decision-making system, when a new decision-making strategy or method is adopted, more time and economic costs need to be invested. Therefore, the decision-makers will be more accustomed to remain loyal to the original strategy when facing the new strategy choice (Dobusch and Schüßler 2013). Because this strategy will bring about cost reduction and efficiency improvement, it further encourages decision-makers to adopt inherent strategies, thus forming a loop.

These four mechanisms all follow the same logic, that is, there is a logic loop of positive feedback (Koch et al. 2009). Specifically, a self-reinforcing process presents incremental benefits or positive feedback, and each step produces results that add up to a virtuous cycle. In addition, there needs to be a link between at least two variables in the positive feedback loop. Their links follow the following rule: the higher (lower) level of one variable leads to the higher (lower) level of the next variable that has a direct logical connection, thus leading to a higher (lower) level of the next adjacent variable.

**Stereotype path dependence in the online outsourcing market**

Our discussion of stereotype path dependence is based on the context of the online outsourcing market. This paper aims to establish the stereotype path dependence in online outsourcing market based on the
formation rules of path dependence and the contextual characteristics of the online outsourcing market. This process consists of two key stages: the first is to establish the trigger mechanism of stereotype self-reinforcing cycle, and the second is to build the self-reinforcing cycle of stereotypes.

**Triggers for path dependence in the online outsourcing market**

Contextual situations have an important influence on the occurrence and intensity of self-reinforcement cycles (Koch et al. 2009). In North’s conceptualization argument (North 1990), the context provides the necessary preconditions for self-reinforcement. If the context is a well-established market or has no transaction costs, there will be no self-reinforcing cycle and path dependence. We summarized several environmental factors in the context that affect the path-dependent processes (2011), including power structure, uncertainty, and the complexity. These factors will cause some rigidity and inertia (Koch et al. 2009), which will have an impact on the decision-making results. Similarly, it is reasonable to speculate that these factors can provide a similar explanation for path dependence in the context of the OOM. Combining the employment characteristics of the OOM, we explain the path dependence in this context from three aspects: the power structure, uncertainty, and complexity.

**Power structure in the online outsourcing market**

Power asymmetry is hidden in many situations (Lukes 2004), and Gaventa (1982) proved that power asymmetry can exist in a positive feedback process for quite a long period. Specifically, this process of positive feedback will break the conflict of relative balance and transform it into a huge inequality. Meanwhile, positive feedback can also increase the asymmetry of power under the action of time (Pierson, 2011). Pierson (2011) demonstrated that the asymmetric distribution of power in the political context is a key source of positive feedback, as well as the source of path dependence.

We discussed the power asymmetry factor in the online outsourcing context to explain the influence of this contextual factor on path dependence. There is a serious problem of information asymmetry in the OOM. Kingsley et al. (2015) found that there is information asymmetry between employers and applicants, which creates an asymmetrical power relationship between the two subjects in the OOM. In addition, the OOM follows the reverse auction mechanism which is dominated by the buyer (Hong and Pavlou 2017), that is, the employer decides the outcome of the employment, which also constitutes an asymmetric power relationship.

**Uncertainty in the online outsourcing market**

Uncertainty about the behavior of others and unforeseen incidents, and this kind of uncertainty is unpredictable (Hollstein et al. 2017). In the context of high uncertainty, reducing uncertainty can build positive feedback. Path dependence exists in such a system with positive feedback, and there is a high possibility that the path-dependent locked state cannot provide the maximum return (Cowan and Gunby 1996).

The online outsourcing system is a system with greater uncertainty. Specifically, because it does not depend on geographic location, the online system is the only source of information, but the authenticity of the information cannot be verified. In addition, information in the reputation system in the OOM changes in real-time, which also increases the uncertainty of information. Meanwhile, the attitudes, personalities, and other information in the OOM are difficult to obtain accurately (Chan and Wang 2018). To reduce the uncertainty in the hiring process, the employer will rely on the stereotype path to make decisions, thereby constructing positive feedback. This path dependence with positive feedback does not provide the maximum return (Cowan and Gunby 1996). In other words, the lock-in of stereotype path dependence often leads to the inability to choose the most suitable employee.

**Complexity in the online outsourcing market**

The complexity of decision-making systems will prevent decision-makers from applying rational decision models (Weick and Sutcliffe, 2001). The unclear definition of the problem, the lack of clear solutions, or implicit evaluation can lead to irrational decision-making (Koch et al. 2009). Since the decision-maker’s time, knowledge and ability are limited, in a recommendation system with high complexity, the decision-
maker will reduce the complexity by simplifying the information or focusing on the key information, which leads to path dependence.

The complexity in the OOM is reflected in three aspects. First, the complexity of information types: To reduce information asymmetry, online systems provide a variety of information about freelancers. Second, unstructured interview rules: In different outsourcing platforms, the type of information is not consistent, so it is difficult to establish a unified evaluation system and evaluation standard but can only implement the unstructured interview. Finally, the homogeneity of information: The information of freelancers in the same job field is highly homogenous, which also increases the complexity of hiring decision-making.

It is worth mentioning that while developing the conceptual theoretical framework, we found that the characteristics of the online employment environment and the three environmental characteristics of path dependence are consistent, which validates the rationality of our introduction of path dependence to explain stereotypes. The mapping relationship between the situational characteristics of online outsourcing market and the three driving factors of path dependence is shown in the Table 4.

<table>
<thead>
<tr>
<th>Information characteristics</th>
<th>Presentation of situation characteristics</th>
<th>Performance of driving factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncertainty</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy of decision information</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Stability of decision information</td>
<td>Dynamic</td>
<td></td>
</tr>
<tr>
<td>Complexity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Types of information</td>
<td>Very Rich</td>
<td>High</td>
</tr>
<tr>
<td>Assessment Criteria</td>
<td>Inconsistent</td>
<td></td>
</tr>
<tr>
<td>Homogeneity of decision information</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>interview method</td>
<td>One-to-One</td>
<td></td>
</tr>
<tr>
<td>Power</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information Asymmetry</td>
<td>Serious</td>
<td>High</td>
</tr>
<tr>
<td>Auction mechanism</td>
<td>Reverse</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. The Mapping Relationship

**Self-reinforcing cycle in the Online Outsourcing Market**

Based on sorting out the operation mechanism of the online employment system and the formation mechanism of stereotypes, we find that stereotype results can be strengthened by the reputation system of the online hiring platform. We constructed a unique positive self-reinforcing cycle of stereotypes based on stereotype theory and the systematic environment characteristics of the online labor market, involving five factors, namely stereotype, impression expectation, hiring decision-making, working experience, and online reputation.

Stereotype assigns different characteristics to members of a particular social category, thus causing clients to create different expectations for different groups of freelancers (Fraidin and Hollingshead 2015). Clients will subconsciously categorize groups after perceiving facial features due to the stereotype, such as female groups and male groups, and then subconsciously assign different characteristics to female groups and male groups. Then the expectations or impressions of freelancers influence decision-making and task assignment (Hollingshead and Fraidin, 2003). If the client’s stereotype-based expectations of a freelancer match the skills required for the task, the freelancer is likely to be hired. For example, because men are expected to perform better in technical and problem-solving tasks, clients may prefer to hire men for technical work tasks. After being hired repeatedly in the same field, these experiences will strengthen the skills and experience of the freelancer in this professional field, making him more adaptable to this type of work in the future (Fraidin and Hollingshead 2015; Littlepage et al. 1997). The value of work experience per se adds to one’s online reputation (Jin and Kato 2006), and the reputation information is closely related to the work experience of freelancers (Gandini et al. 2016). That is to say, the more work experience in a field, the better performance, higher customer ratings, and better customer reviews. Due to the unique employment mechanism of online outsourcing platforms, employers’ decision-making will primarily rely on the
reputation system (Lukac and Grow 2021). If a male freelancer has an excellent online reputation in the field of IT tasks and a woman has an excellent online reputation in the field of sales or consulting work, this, in turn, will strengthen the client’s stereotype perception. The reputation system validates employer stereotypes about gender, which will lead to employers’ tendency to assign the same type of work to a fixed group of people in the future. Based on the characteristics of the OOM, we developed a cycle of the self-reinforcing effects of stereotypes in the online hiring context, as shown in Figure 3.

![Figure 3. The Self-reinforcing Cycle of Stereotypes](image)

Stereotype will affect employers’ expectations for freelancers, which will affect hiring decisions. Then the decision will affect the improvement of one’s experience and the effective accumulation of knowledge in the field of work, which will be reflected on the reputation system of the platform. Having richer platform work experience in a certain task area will make them more suitable candidates for the same type of task. Therefore, online reputation will in turn reinforce the employers’ stereotypes, which will affect their next round decision. Stereotype, hiring expectations, hiring decisions, work experience, and online reputations interact in a self-reinforcing cycle. Stereotypes start the cycle through employers’ expectations for freelancers, which lead to rigid hiring decisions, and different degrees of task experience will be reflected in the OOM through the evaluation mechanism provided by the platform, thus proving that the rigid assignment of tasks is reasonable.

This self-reinforcing cycle reduces costs because the use of stereotypes to form impressions requires less effort than careful attention to personalized information (Macrae et al. 1994). However, this fixed cycle pattern makes the stereotyped differences between different groups larger and larger, reinforcing employers’ reliance on the above cycle pattern.

**Formation of stereotype path dependence in the OOM**

Finally, we construct a two-stage conceptual framework for stereotype path dependence in the OOM against the three-stage path dependence model (Figure 4). The third stage as a complete lock-in state (Pierson, 2000) is unlikely to exist in the OOM, as there is plenty of other information for making decisions. Therefore, we aim to build the first two stages of path dependence. First, the contextual characteristics of the OOM drive the formation of path dependence, including power asymmetry, uncertainty, and complexity. The trigger of these environmental factors of the OOM is the critical juncture in the original path dependence. Then, we construct the stereotype self-reinforcing cycle, which is the formation stage of path dependence. The existence of this reinforcement cycle leads to the “Lock-in” state mentioned in the original path dependence, and this lockdown makes it difficult for clients to change their reliance on stereotypes.
Two-stage intervention approach

The conceptual framework of stereotype path dependence in the online hiring market established in this paper provides systematic theoretical guidance for alleviating hiring discrimination. Since the establishment of stereotype path dependence depends on the driving stage and the forming stage of path dependence, the basic idea of alleviating hiring discrimination is to intervene in these two stages, and avoid the stereotype dependence path by improving the environmental factors that trigger the formation of path dependence or breaking the self-reinforcing cycle. As a conceptual tool, this two-stage intervention method provides a framework of strategic guidance and systematic theoretical evidence for reducing hiring bias and improving OOM fairness. We drew the two-stage intervention model as shown in Figure 5.
In the trigger phase (phase 1), the formation of stereotype path dependence can be interrupted by intervening in the situational factors that trigger the formation of path dependence. Based on our conceptual model’s three triggers of power asymmetry, system uncertainty, and system complexity, we propose the following three methods, including reduce system uncertainty, reduce the system complexity, and balance the power structure. In the formation phase (stage 2), stereotype path dependence can be interrupted by interfering with the generation of positive self-reinforcing cycles. The critical logic of the self-reinforcing cycle is that the reputation system reinforces the stereotype of decision-makers. To address this, we propose that the primary measure is to avoid or reduce the reinforcing effect of reputation information on stereotype.

It is worth mentioning that path dependence theory puts forward that path dependence is more prone to the path switching in the early stage of formation (stage 1), which gives us theoretical enlightenment. Specifically, although we can intervene in the two stages to prevent or alleviate the formation of stereotype path dependence, the most effective method is to control the three forming factors triggering path dependence.

Discussion

We made three interesting findings. First, we found that the OOM is characterized by high complexity, strong uncertainty, and unequal power structure, and these features are highly consistent with those of the context in which path dependence exists. This result proves that it is reasonable to introduce path dependence to explain the stereotype of the OOM, and also indicates that the environmental characteristics of OOM meet the conditions for the formation of path dependence. Another interesting finding is that the mechanism of the reputation system in the OOM is a key factor in creating a self-reinforcing cycle. Driven by stereotype, employers’ choices will result in a particular category of freelancers having extensive work experience in a particular field. This experience is then reflected in the freelancer’s online reputation system, which in turn serves as a valid confirmation of the employer’s original choice, allowing the employer to repeat the same choice next time. But in traditional hiring markets, where there is no online reputation system, it is difficult to visually measure the impact of past hiring choices. The third interesting point is that we have found effective ways to reduce stereotype bias based on this conceptual framework.

Path-dependent theory suggests that the further down the path, the more likely it is to lead to fossilization, so it is most effective to intervene before path-dependent is triggered, which gives us reason to consider improving OOM’s three environmental features as the main countermeasure against hiring bias. The path dependence framework we have constructed for the OOM gives us new ideas to reduce the role of stereotypes in hiring decisions. This two-stage conceptual framework of path dependence provides a fusion of path-dependent characteristics and hiring characteristics of the OOM.

We posit that we can improve the fairness of the online hiring system by intervening in the context characteristics of different stages of path formation. Through these theoretical frameworks, we finally propose a two-stage intervention approach. Briefly speaking, in the first stage, the fairness of the online employment system can be improved by intervening in the situational factors that trigger the formation of path dependence. In the second stage, the effect of stereotypical path dependence can be avoided by interfering with the generation of positive self-reinforcing cycles. We then discuss the implications of these findings for theory and practice, and the limitation and future research.

Theoretical Implications

Our critical theoretical findings are as follows. Firstly, this is the first time the overall framework of path-dependence theory has been applied to explain stereotypes in OOM. We demonstrate the rationality of introducing path-dependence to explain stereotypes through the theoretical basis and the consistency between environmental characteristics and those with path-dependence in OOM. Although some studies focus on hiring bias and stereotypes in OOM, the commonly used heuristic theories (Chan and Wang 2018; Liang et al. 2018) are limited to explaining the formation reasons for stereotypes, which cannot provide a comprehensive perspective. The theoretical framework established in this paper can cover the whole process of stereotype generation, development, and elimination, which provides a new theoretical perspective for using ICT to improve the institutional equity of the OOM, thus expanding the development
of path-dependent theory. Secondly, this paper summarizes the environmental characteristics of the OOM market, restores the self-reinforcing cycle in OOM, and clarifies the role of the OOM reputation system in reinforcing stereotypes, which promotes broader literature research on path dependence, stereotypes, and OOM reputation system. In addition, the mapping research of power structure, system uncertainty, and system complexity extends the understanding of OOM contextual features. Thirdly, based on the conceptual model of path dependence, we develop a two-stage intervention model, which provides systematic theoretical guidance for alleviating hiring bias. This model deepens understanding of the mechanism and principle of stereotyping in OOM.

**Practical Implications**

The two-stage intervention approach provides practical guidance for reducing hiring bias by breaking the generation of the stereotype path dependency in the OOM. In detail, avoiding the generation of the stereotype path dependency can be best achieved by improving the contextual characteristics of the OOM and breaking the self-reinforcing cycle.

To improve the contextual characteristics of the OOM in the trigger stage, the OOM could conduct three countermeasures. First, reduce system uncertainty. There are two main reasons for uncertainty in online hiring systems: the employer’s inability to verify the authenticity of information and the lack of service quality assurance mechanism. The possible method is that the platform requires freelancers to provide certificates or proof of relevant skills or experience, and then the platform provides guarantees for certified freelancers. At the same time, a two-way evaluation mechanism should be established. When either party of the transaction has objections to the service, the platform can effectively intervene to ensure the regular operation of the service. Apart from those two factors, the inaccuracy of online reputation information will also lead to system uncertainty. For example, there is a linear relationship between the cumulative number of jobs and the registered and active duration of freelancers, while employers cannot accurately measure it within a limited time. Therefore, the platform should carry out necessary back-end calculations to directly provide employers with accurate reputation information controlled by time and other factors. Second, reduce the complexity of the system. One reason for this complexity is the homogeneity of the information. Platforms can require freelancers to provide specific descriptions of their work experience and relevant professional certification when providing personalized data. Another manifestation of complexity is the lack of cross-platform decision standards. The platform can provide the ranking mechanism of the platform and the calculation method of important reputation indicators based on the reputation system, which can help reduce the difficulty for employers to process complex information. Third, balance the power structure. The platform can require employers to conduct group interviews and evaluations in the manner of multiple reviews, effectively preventing hiring stereotypes from playing a huge role in single-person evaluations. Furthermore, controlling the proportion of the number of freelancers and employers in each service category is also a useful measure because too large or too small a proportion will create an imbalance in the power structure, leading to stereotyped path dependence.

To break the self-reinforcing cycle, we propose that the primary measure is to provide a higher weight for those freelancers with high reputations but belong to non-popular categories (women or minorities) so that the information of these freelancers will be more frequently recommended to the clients. Since the image of these well-performing freelancers’ conflicts with traditional stereotypes, this strategy can reduce the reliance on stereotypes to some extent.

We summarize these countermeasures in Table 5.

<table>
<thead>
<tr>
<th>Stage Goals</th>
<th>Countermeasures</th>
<th>Specific suggestions for the OOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1: Improve the contextual characteristics (Main countermeasures)</td>
<td>Reduce system uncertainty</td>
<td>Provide guarantees for certified freelancers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Establish a two-way evaluation mechanism (freelancers and employers).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Provide back-end calculations to directly provide employers with accurate reputation information controlled by time and other factors.</td>
</tr>
<tr>
<td></td>
<td>Reduce system complexity</td>
<td>Require freelancers to provide specific descriptions of their work experience</td>
</tr>
</tbody>
</table>
provide the ranking mechanism of the platform and the calculation method of important reputation indicators
Balance the power structure
Require employers to conduct group interviews, avoiding single-person evaluations.
Control the proportion of the number of freelancers and employers in each service category
Stage 2: Break the self-reinforcing cycle
Avoid the reinforcement of stereotypes by reputation information
Provide a higher weight for those freelancers with high reputations but belong to non-popular categories (women or minorities).

| Table 5. Specific Countermeasures for Alleviating Hiring Bias |

These countermeasures can help platforms or managers to intervene against hiring bias at different stages, providing more opportunities for fairness improvement and sustainable development of OOM.

Limitation and Future Research

This study also has certain limitations, that is, it does not consider some unique characteristics of other types of OOMs. This paper takes Upwork.com as a case to analyze. Tasks in this kind of OOM are all virtual tasks, which are completely dependent on the online system. However, in some other types of OOMs, such as TaskRabbit.com, the tasks are all carried out offline, such as moving, installation, etc., and the stereotype path dependence in this kind of OOM still needs to be further studied. The future research direction of this paper is to conduct an empirical study on the framework of stereotype path dependence in the OOM and explore how contextual characteristics adjust the effect of stereotype on decision outcome by quantifying the three driving factors of path dependence and decision results.

Conclusion

We explain stereotypes by establishing a two-stage conceptual framework for stereotype path dependence in the OOM.

First, we explained the formation of stereotypes in terms of the triggering stage of path dependence, in which we establish the trigger mechanism of path dependence. Specifically, we summarized three contextual factors that influence path dependence from previous literature: power structure, uncertainty, and complexity. Then, we summarized the hiring characteristics in the context of the OOM and mapped these characteristics to three dimensions of influencing factors. We found that these three features in OOM are highly consistent with those in path-dependent environments.

We then outlined the development of stereotypes in terms of the path-dependent formation phase, which represents the generation of self-reinforcing cycles, and we restore the OOM’s self-reinforcing cycle. Specifically, based on the online hiring process and the role of the online reputation system, we formed a positive feedback loop model by constructing the logical relationship among the five critical elements of stereotype, impression formation, hiring decision-making, working experience, and online reputation.

The research results of these two stages demonstrate the rationality of introducing path dependence to explain stereotypes and the existence of stereotype path dependence in the OOM system. Finally, we developed a two-stage intervention approach based on this conceptual model. It aims to break stereotype-dependent pathways by modulating environmental characteristics and breaking self-reinforcing cycles, thus alleviating hiring bias.

References

Analysis and Strategic Management (14:1), pp. 5–19.


