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## **Herd Behavior In Global Online Shopping Carnival**

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### **ABSTRACT**

We have witnessed the magnificent power of herd behavior exhibited by the frantic crowd during the Alibaba's global online shopping carnival (OSC) which has made 9 Guinness world's records within 24 hours. This study explores the cognitive herding process and the critical factors facilitating herd behavior in OSC. Meanwhile, applying the theory of carnival, this study identifies three OSC behaviors which spread through the OSC herd. Using 473 samples from OSC participants, the hypotheses are supported by the empirical results. Information incentive (e.g. promotion motivation and review information) and social influence (e.g. peer mimicry and endorsement influence) are two crucial preconditions for herd behavior; participation, interaction and playfulness capture the essence of OSC behavior. The results provide insights to: (1). the cognitive process of herd behavior; (2). the critical factors facilitating herd behavior in OSC; (3) the important OSC behavior imitated during the herding process.

**Keywords:** Online Shopping Carnival, Herd Behavior, Electronic Commerce

### **INTRODUCTION**

The rapid growth and advantages of electronic commerce (EC) present a new paradigm for conducting business worldwide [43]. Especially, the massive sales volume from the EC market in China is pushing Asia-Pacific's growth forward, making it become the largest regional EC market in the world (eMarketer 2014a). Alibaba Group known as the global EC giant has focused on the Chinese market with global perspective [32]. In 2016, Alibaba's retail platforms in China surpassed RMB 3 trillion in gross merchandise volume (GMV), equivalent to 476 billion USD [3].

Alibaba's annual global online shopping carnival on November 11, simply called "OSC", is well known as the most successful online promotion campaign since its debut in 2009. The OSC event begins in early November each year and lasts through the end of November 11 shopping day. Prior to November 11, participants could accumulate discount coupons and gift cards by playing shopping games and attending live shows. These coupons and gift cards can be used on the shopping day to offset the prices of the products. For the few years, the OSC have witnessed steady growth in the sales volume [73]. During the most recent event in 2015, it generated 14.3 billion USD GMV and made 9 Guinness world's records [4]. This intriguing phenomenon featured with online technologies and carnival excitement has attracted the OSC participants from 232 countries and regions worldwide [2]. Such an event has demonstrated the magnificent power of herd behavior exhibited by the frantic crowd, which created the final success of the OSC. As the OSC contains complex and voluminous information, it often exacerbates uncertainty of the potential participant's decision and entices the participants' herd behaviors. Therefore, it is important to understand the critical factors and cognitive process behind the herd behavior in the OSC. A clear understanding of these issues could improve strategy, technology, and marketing decisions for the organizers and vendors in the OSC.

The herd behavior has been reported in financial investment (Bikhchandani & Sharma, 2001), marketing [14], and political arenas [68]. Recently it has been applied to the usage of Internet technologies [39][40][24] and information systems [65]. However, few have discussed the cognitive process of herd behavior [65]. In our opinion, the process of herding begins with the uncertainty of decision due to the lack of information. Thus, additional information from other sources is likely to cause discounting of own information, adjusting the initial beliefs, and imitating others' behaviors [12][65]. This additional information triggers the herding process and information cascade in which the information is passed throughout the herd from one to another [18]. To improve the quality of decision making, one needs the information to maximize the values and minimize the risk of the decision. In the context of OSC, the promotion information promises the values [58]; while the prior review information reduces the risk [54]. Moreover, the observation of predecessors' behaviors could reinforce the belief of imitating others' behaviors [59]. In the OSC context, such an observation focuses on three elements of carnival behavior: participation, interaction, and playfulness, as prescribed in Bakhtin's TOC [47]. Since the OSC behavior determines the success of the event, it is critical to examine whether the TOC can plausibly explain the dynamics of the behavior. Scholars have suggested that the examination of certain construct (in this case, the OSC behavior) in the new context may bring novel understanding and the generalization of a theory [70]. This study aims to achieve this purpose and examine the herd behavior in the OSC. Specifically, there are two research questions:

RQ1. How to measure the herd behavior in the OSC?

RQ2. What are the factors influencing the herd behavior in the OSC?

The remaining sections are organized as follows. In the next section, we present the literature review, elaborate the TOC and the herding process, and develop a research model and related hypotheses. Next, a description of research method and research results are presented, including the research instrument development, data collection, data analysis, and research findings. Then, we discuss the research findings and highlight the implications for theories and practices. Finally directions for future research as well as the limitations of the current study are discussed.

## LITERATURE REVIEW AND MODEL DEVELOPMENT

### The Theory of Carnival and the OSC

Carnival by definition is a social sphere that busts open and transforms traditional closed discourses to embrace freedom and equality, and create possibilities for learning and positive change [9][10][47]. It has been known as an important festival during the European history. The work of Russian philosopher Bakhtin [10] explores the role and the features of carnival during the Middle Ages and Renaissance, which is later regarded by researchers as the TOC. During that period, people's daily life is regulated with powerful social hierarchy and conservative medieval ecclesiastical and feudal culture. Bakhtin [10] characterizes carnival as a 'second life' of the people, and as a folk culture embracing freedom and equality, and creating new social relationships with positive changes [47]. The scenery of carnival is mirrored in the OSC. The playful spirit and festival atmosphere of the OSC relieve people from their routine life. It is open to all; each participant can jointly indulge in this online event with shopping, sharing, playing, and laughing. Specifically, the OSC possesses three prominent features as prescribed in the TOC [47]. The description of each feature follows.

#### Participation

The first feature is the active participation of all in the event. In a carnival, the line between spectator and performer is blurred; participants can move in and out of processions [9]. Behavior, gesture, and discourse are temporarily freed. Exaggerated mock battles and mock official businesses are reenacted. With the suspension of social hierarchies and conventions, a joyful 'disorderly conduct' flourishes. The participants live by its laws as long as those laws are in effect; that is, they live a carnivalistic life with new rules and a new mode of life [9, p. 122].

During the OSC, celebrities, fashion leaders, endorsers, sellers, and consumers are all welcome to actively and positively participate in a variety of carnival activities not available during the normal shopping day (e.g., browsing personalized OSC homepages, engaging in carnival games, watching TV shows, or hunting for gifts and bargains, etc.). Thus, this study defines participation as the active and positive behaviors of taking part in a variety of OSC activities, such as browsing, searching, shopping, and gaming.

#### Interaction

A second important feature of carnival is free contact and interaction among people [47]. During the carnival, physical and social distances between people are suspended. In a carnival, life is turned inside out and upside down. This disruption of life's routine, and especially the temporary abolition of powerful social hierarchies, allows participants to experience new relations with each other and the world that are unavailable to them in everyday life. New connections are made; ideas and objects are seen in a new light [9, p. 123].

In the modern society, Internet has become one of the main spaces for experiencing carnival for many people, a space where attitudes and ideas flourish with no intervention of social and physical restrictions [28]. It offers numerous channels and ways for participant to express themselves freely, such as reviewing, rating, and recommending certain products [5]. As an online marketplace, the OSC enables its participants to send and receive messages from friends/buyers/sellers via the instant messaging app or many other channels. New relations can be built, such as developing contacts and interacting with friends, fashion leaders, or other net-friends sharing the similar interests. Sharing the OSC experience, collaborating in gifts and bargains hunting, and exchanging the excitement of OSC are among the topics of interaction. Thus, this study defines interaction as the extent to which people use OSC as a social environment to freely interact with others, even if only temporarily, to share the experience or conduct collaborative activities.

#### Playfulness

The third feature of carnival is the playful manipulation of the everyday world for enjoyment of life [47]. The playful stance has been seen as the signal of carnival in which a play with objects and concepts "pursues a distant prophetic goal" and dispels "the atmosphere of gloomy and false seriousness" [10, p. 38]. Sarcastic role playing is embraced in which "normal constraints and conventions are thrown off, democracy reigns while commoner and aristocrat rub shoulders, the crude and the vulgar are enshrined, the fool reigns" [62, p. 179].

Numerous studies in IS confirm the positive effect of hedonic factors in online shopping and technology usage [55][70]. A high enjoyment associated with experiential behavior often engenders a more positive mood and greater shopping satisfaction [72]. Thereby, in order to entertain the participants, Alibaba Group designs many kinds of playful elements and activities for OSC participants (e.g., shopping games, gifts and bargain hunting, gala TV show, and live shows, etc.) to gain experienced distinguished from the everyday world. Alibaba Group executive chairman Jack Ma has interpreted OSC in China as an entertainment festival, a chance to share the happiness, rather than a mere commercial promotion campaign. Thus, this study defines playfulness as the fun and pleasure derived from the playful experienced distinguished from the everyday world.

during the OSC through gathering, shopping, gift and bargain hunting, show watching, and game playing. Table 1 summarizes the similarities between a traditional carnival and the OSC of Alibaba Group.

Table 1: A comparison of traditional carnival and the global OSC provided by Alibaba Group in China

Attribute	Traditional Carnival [47]	Alibaba Group's Global OSC
Participation	Active participation of all.	During the OSC, celebrities, fashion leaders, endorsers, sellers, and consumers are all welcome to actively and positively participate in a variety of OSC activities, such as browsing, searching, shopping, and gaming.
Interaction	Free contact and interrelation among all.	People can use OSC as a social environment to freely interact with others, such as sharing the OSC experience, collaborating in gifts and bargains hunting, and exchanging the excitement of OSC.
Playfulness	Playful manipulation of the everyday world for enjoyment of life	Playful experienced distinguished from the everyday world is engineered by Alibaba Group in order for the OSC participants to jointly indulge watching live shows and the evening gala TV show, in addition to gathering, shopping, gift and bargain hunting, and game playing.

In this study, we define the OSC behavior as a reflective construct because it meets the attribute of being reflective, in which any change in one indicator is not likely to cause a change in the latent construct [57][51]. Therefore, we model the construct of OSC behavior as a latent construct with three reflective indicators, namely, participation, interaction, and playfulness.

### Herding Behavior Process

It has been widely acknowledged that people have the tendency to mimic each other resulting in herd behavior [24]. For example, people often choose the restaurant with more customers to dine. In other words, people's decision is influenced significantly by decisions of others around them [12]. The concept of herd behavior has been widely used to explain the mimicry of investors and fund managers among themselves in financial market [17]. Similar phenomenon has occurred among marketers who apply herd behavior to entice potential consumers to purchase [14]. Recently, herd behavior has been observed in a variety of contexts in Internet and IT technologies. For example, Chen (2008) reveals that online herd behavior occurs when people are purchasing book at the Internet bookstore. Sun elaborates the herd behavior in technology adoption and further confirms its effect on post-adoptive system use [65]. Several other similar effects are identified in the context of digital auction [29][63], software download [39], among others. Since the effect of herd behavior has been confirmed in a number of prior studies, the discussion of the cognitive process and the antecedents of it might add more knowledge to the understanding of herd behavior [65].

Herding process generally begins from the uncertainty of a decision. The uncertainty of decision is mainly due to the situation of having imperfect information or lacking information, and people perceive his/her inability to predict the correctness and accuracy of the consequences by making certain decision [52]. The situation can be very common in OSC, since the OSC usually contains much complex information and sophisticated functions. Actually, unlike the traditional face-to-face retail environment where products can be seen and touched, information asymmetry and ambiguity is more severe in the online platform [20][24]. For example, millions of online stores with different promotion campaigns, shop features, and service standards, and billions of products with different quality, price, and attributes are presented on the OSC online platform. A large number of features and activities people have limited prior experience are also, such as new bargain hunting activities, gift games, and live shows during the OSC period. It requires extensive knowledge, experience, time, effort, and even money to accurately evaluate the value of the information, which often makes people uncertain about whether they should conduct certain behavior in the OSC (e.g. participation, interaction, and play).

Not surprisingly, under the situation of decision uncertainty, people are more likely to herd by following the lead of additional information sources considered as useful and by imitating others' behaviors, discounting their own information and beliefs which are considered insufficient and incomplete [12][18][65]. The herd behavior emerges, even when people receive a slightly more information than what they already have from other information sources, enticing the individual following the action the additional suggestion, mimicking the predecessors' behavior, and adjusting their initial beliefs [65]. When such imitation behavior occurs in a large number, an information cascade is formed, in which the information is spread throughout the herd [12]. As the online environment, such as OSC, requires participants to infer product/service/activity information based on choices of others and additional information sources, rendering the prevalence of information cascades in OSC, and triggering herd behavior of the OSC participants. Therefore, the influence of valuable information and others' behaviors are highly related to one's herd behavior.

### Information incentive and the OSC behavior

Due to the decision uncertainty caused by imperfect information an individual have, the information provided via other channels can engender herd behaviors. In order to improve the correctness and accuracy of the decision, one commonly

requires information to maximizing the values and minimizing the risk of the decision. In the context of OSC, the promotion information promises the values [58], e.g. large scale sale, while the prior review information reduces the risk [54], e.g. quality store and product recommendation after actual usage. Hence, we refer information incentive as the information the potential OSC participants received from two sources: OSC promotion information and review information, which can facilitate their OSC behavior.

The promotion information often contains price discount which will entice more consumers to purchase the discounted products [43]. Scholars further argue that if potential buyers anticipate a price drop in the near future, they will be motivated to join the shopping activity [42]. During the promotion of OSC, it is claimed that the price offered on that day is the lowest in the whole year. Moreover, the promotion of OSC also campaigns the personalized products recommendation to entice purchase, bargaining hunting activities, and shopping / gift games for potential participants to play solely or cooperate with others for better offer or just for fun. Alibaba engineered the promotion information to foster the participants' beliefs that OSC is the best online marketplace to indulge in. It serves as a reliable and useful information source, compensates the potential participants' initially imperfect information regarding OSC, and eventually facilitates their decision to herd in OSC behaviors. In the promotion information, the OSC participants are suggested to participate in the OSC to acquiring better offer through active information browsing and searching; develop social interaction and cooperation with others for bargaining, or experience and feeling sharing; play and be entertained during the process. Therefore, it is reasonable to presume that OSC promotion information is positively associated with people's decision to herd by conducting a variety of OSC behaviors (participation, interaction, and play).

Review information can be utilized to reduce the risk of conducting certain behavior. Information searching and trial usages of product/service/activities are usually performed by people to eliminate information asymmetry and reduce the decision uncertainty [22]. However, both strategies often consume additional resources [35][59]. Thus, it is reasonable to check prior users' reviews and follow their actions. This is a herding process in which people identify the successful experience of others in using certain product, develop their updated beliefs toward the product, and accept information or advice from others [46].

Participants in OSC often share a variety of review information, such as shopping experience, usage experience of certain brand or trial product, as well as rating scores of an online store (e.g. product quality, service quality, logistic quality), accumulated good comments regarding a store or a product via multiple channels provided by OSC. The online review information shared by predecessors can even exert influence on consumers' attitudes and decisions more powerful than marketer-generated information [26]. Potential OSC participants monitor the comments of others regarding the OSC products and activities; use them as a basis for their own choices to conduct the OSC behavior. Eventually, people accept the suggestions and perform the OSC behavior by following the leads in review comments. We hereby postulate that review information positively facilitates the herding of OSC behavior (participation, interaction, and play).

Consequently, information incentive in this study is operationalized as a formative construct with two dimensions, namely promotion information and review information. These two dimensions jointly capture the essence of information incentive and affect the OSC behavior. Hence we hypothesize.

H1. Information incentive is positively associated with the OSC behavior.

### ***Social influence and OSC behavior***

Another important strategy to diminish the uncertainty of decision is the observation of the same decision has been repeated by many different people [18][65]. According to the compensation-based herd rational, people would like to imitate others due to the risk-aversion strategy [52]. In other words, people may be worried about the possibility of wrongly rejecting a good OSC and then lost the opportunity to get a valuable price offer, interact with other, or have fun during the process. Moreover, others behavior usually serves as a heuristic of social proof which significantly influences people's decision of mimicry [44]. Tanner et al. reveal that even at this Internet era, many consumers' decisions are fundamentally influenced in the social environments [67]. The cognitive process of imitating others can be explained from the perspective of social learning theory (SLT) [11]. The potential participants are able to observe and capture the OSC behavior performed by people in their social networks and net-friends, and endorsers (namely, attention in SLT). Then, they understand how to perform and evaluate their ability to perform the observed OSC behaviors (namely, retention and reproduction). Motivated by risk-aversion strategy, or promotion camping, or other stimulus (namely, motivation), the potential OSC participants (the learner) reproduce what they have learned from others' behavior; in other words, the individual perform the herding of OSC behavior in this context.

During the process of learning and mimicry, besides the number of the predecessors, the identity also matters; both may elicit herd behavior [59][65]. In the context of OSC, the number of people is voluminous, making the identity of the predecessors (e.g., close friends, celebrities, fashion leaders, community members) as the primary determinant. Through the lens of SLT [11], the behavior of people from an individual's reference groups significantly influences his/her own behavior [7][34]. The most powerful influences may be derived from the significant others (e.g., peers, friends, partners, and families) in one's social network [56], or the endorsers represented by celebrities, pop stars, fashion leaders [18], or familiar community members. Accordingly, this study use two reference groups (i.e., peers and endorsers) to examine their social influences in the OSC. And we conceptualize social influence [70] as the OSC behavioral belief derived from the perception of other people's behaviors,

such as from the observation of peers' and endorsers' behaviors.

In general, people mimic multiple aspects (e.g., behavior, gestures, facial expression) of the significant others [67][44]. An individual's behavior during OSC is affected by the behaviors of their peers and other net-friends, since they learn from observations in this virtual social situation. Particularly, according to prior studies based on SLT [19], when friends' behavior are aggregated in one certain platform which allows users to view and recall friends' actions, it makes the link more salient. In this study, people may observe their peers' OSC behaviors (participation, interaction, and play) aggregated on OSC platform, such as gaming, purchasing, cooperating, experience and excitement sharing during the OSC period. Through this observation, people are more likely to mimic their peers' behaviors and preferences [16]. Accordingly, this study postulates that peer mimicry is positively associated with the OSC behavior (participation, interaction, and play).

On the other hand, it is quite common that people follow endorsers (Till & Busler, 1998), such as successful others [11], reputable early adopters [1], and fashion leaders [18], who are believed to have better information and to make correct decisions. Hence, the endorsers have power to create large-scale social influence regarding certain products, concepts, and alike. In the context of 11.11 Global OSC in China, social influence through endorsement has been applied to a large extent. In addition to inviting pop stars, fashion leaders, opinion leaders to promote the OSC during October and November, an evening gala television show performed by many celebrities attracts tens of millions audiences on the day of OSC. The endorsement influence on the OSC behavior of the participants is fully capitalized. Thus, this study postulates that endorsement influence is positively associated with the OSC behavior (participation, interaction, and play).

Accordingly, social influence in this study is operationalized as a formative construct with two indicators, namely peer mimicry and endorsement influence. Social influence derived from peer mimicry and endorsement influence is likely to trigger herding of the OSC behavior. Thus we postulate the following hypothesis:

H2. Social influence is positively associated with the OSC behavior.

### Research Model

Based on the discussion above, we proposed a research model as shown in Figure 1. In this model, there is one consequence of herd behavior process: the OSC behavior. We argue that the two antecedents of herd behavior may affect the OSC behavior. First, the information incentive is proposed as a formative construct driven by promotion information (PI) and review information (RI). Meanwhile, the other antecedent, social influence, is also postulated as another formative construct driven by peer mimicry (PM) and endorsement influence (EI). Next, we postulate that the OSC behavior is a formative construct driven by participation (PA), interaction (IN), and playfulness (PL). Finally, we propose that information incentive and social influence are critical factors in fostering the OSC behavior.

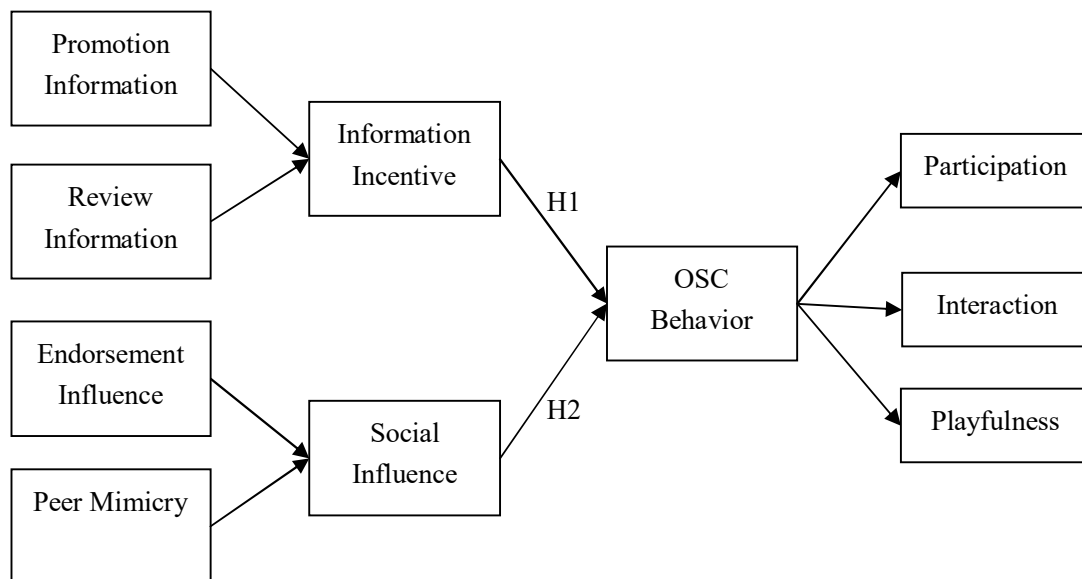


Figure 1: Research Model

### REAESARCH DESIGN

#### Research Instrument Development

A survey questionnaire was developed to collect empirical data. All the construct of the research model were measured via the use of multiple-item perceptual scales. All items were measured using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The majority of the items are adapted from the extant research, and slightly modified to fit our research context. Based on the definition in the literature and the context of this study, some new items were self-developed and further examined. The social influence items were adapted from Tanner et al. (2008) and Daneshvary and Schwer (2000) [67][27]. The

measures for information incentive were taken from Lai et al. (2006) and Lee et al. (2011) [43][46]. The measures for OSC behavior were modified from Tsai and Pai(2013), Wu et al. (2000) [68][73], and Venkatesh et al. (2012)[70].

In order to ensure the content validity of the instrument, a small scale pretests and personal interviews were conducted. Thirteen panelists (including six professors and four doctoral students of information system departments, three master students who have participated in OSC) were interviewed and a pilot test of the questionnaire was conducted. Eventually, this step aims to ensure the content validity which suggests completeness and the appropriateness of the research instrument. In other words, all the aspects of a construct are measured appropriately in the research domain, which ensures the validity and reliability of the measurement.

Each panelist is expected to judge whether a scale item (a question) is essential for measuring the corresponding constructs in the research model. A formula of content validity ratios (CVR) developed by Lawshe (1975) is applied in this study [45]. The formula is  $CVR = (ne - N/2) / (N/2)$ , while  $ne$  refers to the number of panelists consider the specific questions essential, and  $N$  means the total number of panelists. The value of each instrument CVR should be above 0.56 ( $p < 0.05$ ) [45]. Altogether, 31 questions are included in the initial instrument list. According to the results and the feedback of experts, the instrument is refined through wording, rephrasing sentences, and eliminating ambiguous questions. The final questionnaire contains 28 questions.

The questionnaire is consisted of three parts. The first part, a motivation letter, states the purpose of this study and the relevant definitions. In the second part, respondents are asked to answer questions, providing demographic information (e.g., age, gender, occupation, average income, experience and the amount of purchase in the OSC, etc.). Finally, the third part contains the items measuring the constructs of the research model.

### Data Collection

The research setting of this study is the 11.11 Global OSC provided by Alibaba Group in China. The reason for choosing this OSC is because it has all the attributes of a traditional carnival described by the TOC [9][10] as shown in Table 1. This study aims to investigate the OSC behavior displayed by the participants. A web-survey approach was preferred due to its advantages in this study. Firstly, it is an effective way to collect data from a wide audience, without being restricted to a geographic location. It is especially suitable in this study since the phenomena we investigate and targeting respondents are all internet related. Secondly, the speed of data collection is an important advantage in a web-based survey. It allows the researcher to obtain a large amount of respondents in a short space of time. The empirical data was collected during March to April, 2015. The respondents were randomly selected to offer a variety of incentives, such as Youku membership. Finally, 473 questionnaires were collect, among which 428 respondents were identified as valid respondents. The valid-return rate is 90.49%. The profile of the valid respondents is presented in Table 2.

Table 2: Demographic profile of respondents

(N=428)	Classification	Number	Percentage
Gender	Male	175	40.89%
	Female	253	59.11%
Age	Less than 18	2	0.47%
	19-23	69	16.12%
	24-30	171	39.95%
	31-40	137	32.01%
	41-50	41	9.58%
	Above 51	8	1.87%
Occupation	Employed	320	74.77%
	Free-lancer	13	3.04%
	Housewife/husband	2	0.47%
	students	85	19.86%
	Job-waiting	2	0.47%
	Retired	0	0%
Monthly income (RMB)	others	6	1.40%
	Less than 500	23	5.37%
	501~1,000	31	7.24%
	1,001~1,500	22	5.14%
	1,501~2,000	13	3.04%
	2,001~3,000	22	5.14%
	3,001~5,000	89	20.79%
	5,001~8,000	132	30.84%
	8,001~15,000	78	18.22%
	15,001~20,000	11	2.57%
		7	1.64%



	Above 20,001		
Experience of participating OSC(2009~2014)	2014	374	87.38%
	2013	302	70.56%
	2012	180	42.06%
	2011	88	20.56%
	2010	48	11.21%
	2009	23	5.37%
	None	26	6.07%
Total purchase in 2015 OSC (RMB)	Less than 100101~500	21	4.91%
	501~1,000	85	19.86%
	1,001~5,000	93	21.73%
	5,001~10,000	149	34.81%
	10,001~20,000	55	12.85%
	20,001~30,000	13	3.04%
	Above 30,001	3	0.70%
	None	4	0.93%
Average number of interaction time per day in 2015 OSC	Above 40 time per day	5	1.17%
	30~39	12	2.80%
	20~29	22	5.14%
	10~19	56	13.08%
	5~9	88	20.56%
	1~4	129	30.14%
	None	108	25.23%
		13	3.04%

### Data Analysis Methods

As an important data analysis method, structural equation modeling (SEM) is applied. In the field of IS research [64][37], SEM is a very popular technique for high quality statistical analysis. The goal of SEM is to analyze causal models including the latent constructs measured by multiple items in multivariate data sets [38]. Moreover, SEM has been suggested as a rigorous method with which to examine the reliability and validity of the instruments and the significance of relationships between constructs, and provide a set of indices for evaluating the model fit [66]. Furthermore, SEM is best suited to data analysis in confirmatory research [37][66]. Hence, in order to examine the theory-based research models and hypotheses, SEM has been employed as the data analysis method in the current study.

In this study, partial least squares (PLS) were used to assess the measurement model and then test the hypothesized structural model. PLS was utilized to accommodate the presence of a complex model and the exploratory nature of this research [36]. In addition, PLS uses bootstrapping to estimate standard errors for parameter estimate, which somewhat helps avoid the restrictive distributional assumptions [25]. Due to the above reason mentioned, SmartPLS 2.0 [60] was applied to the data analysis in this study.

In this study, a two-step approach was followed, which is recommended by Anderson and Gerbing (1988) for proceeding with the data analysis [6]. Confirmatory factor analysis (CFA) was used to estimate the measurement model. By using this technique, the reliability and validity of the measurements were examined. Then, the path coefficients and the statistical significance were examined by testing the structural model applying the bootstrapping procedure.

## DATA ANALYSIS AND RESULTS

### Measurement Validity and Reliability

Confirmatory factor analysis was utilized to test the adequacy of the measurement. The assessment of reliability, convergent validity, and discriminant validity was conducted using PLS 2.0. The reliability of the instruments was assessed by examining the composite reliability [14]. The convergent validity is assessed by factor loading and Average Variance Explained (AVE) [25][36]. The discriminant validity is evaluated by the criteria of the square root of the AVE and the items load on their associated factors comparing with the items load on other factors [25]. The results of which demonstrate a satisfactory fit.

In this study, the value of factor loading are all over the threshold of 0.707, showing that more than half of the variance in an observed item is explained by its construct [64]. The values of Cronbach's alpha which assumes that scores for all items have the same range and meaning; composite reliability and average variance extracted (AVE) of the constructs are all over the thresholds of 0.7, 0.7 and 0.5, respectively, as shown in Table 3. The squared roots of AVE are higher than their correlations with other constructs, as shown in Table 4. In addition, the cross-factor loading was further tested to examine the measurement validity as presented in Appendix B. The results show that all items fit their respective factors quite well. The results suggest the measures have unidimensionality, convergent and discriminant validity.

Table 3: Reliability and validity of measurement

Construct	Dimension (No. of items)	ID	Minimal factor loading	AVE	CR	$\alpha$
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Informational Incentive	Promotion information (5)	PI	0.71	0.59	0.85	0.77
	Review information (4)	RI	0.74	0.59	0.85	0.76
Social Influence	Endorsement influence (4)	EI	0.78	0.67	0.89	0.84
	Peer mimicry (4)	PM	0.79	0.69	0.90	0.85
OSC behavior	Participation (4)	PA	0.76	0.63	0.87	0.83
	Interaction (4)	IN	0.78	0.67	0.89	0.83
	Playfulness (5)	PL	0.79	0.66	0.92	0.89

Table 4: Inter-construct correlations

	IN	EI	PI	PA	PM	PL	RI
IN	(0.82)	0	0	0	0	0	0
EI	0.56	(0.82)	0	0	0	0	0
PI	0.56	0.65	(0.77)	0	0	0	0
PA	0.59	0.38	0.51	(0.79)	0	0	0
PM	0.60	0.70	0.66	0.478	(0.83)	0	0
PL	0.64	0.54	0.60	0.65	0.62	(0.83)	0
RI	0.45	0.60	0.51	0.38	0.55	0.45	(0.77)

Note: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

### Evaluation of the Structural Model

To test our research model, we used PLS, a latent structural equations modeling technique that utilizes a component-based approach. Fig. 2 shows the results of the PLS analysis and the path coefficient of the constructs. The predictive validity was evaluated by examining the R square and the path coefficient. The results indicate that the variance of the herd behavior in carnival explained by information incentive (e.g., promotion information and review information) and social influence (e.g., endorsement influence and peer mimicry) is 52.1%. Therefore, the research model demonstrates a strong explanatory power for joining the carnival in OSC.

Hypothesis 1 is strongly supported, according to the significant path coefficient from information incentives to carnival ( $\beta = 0.375$ ,  $p < 0.001$ ). This result implies that the potential participants who perceive a higher level of information incentive are more likely to participate carnival in OSC. Similarly, the direct effect drawn from social influence to OSC is confirmed by the significant path coefficient ( $\beta = 0.396$ ,  $p < 0.001$ ). Accordingly, the hypothesis 2 is supported by the empirical data. It indicates that social influence exerts an even stronger effect on the behavior of carnival in OSC. It can be referred that the potential participants' perceptions of the social influence positively affect the herd behavior of join in SCO.

In addition, as shown in Fig 2, information incentive as a formative second order factor is effectively measured with two first order indicators namely promotion information ( $\beta = 0.79$ ,  $p < 0.001$ ) and review information ( $\beta = 0.331$ ,  $p < 0.001$ ). Similarly, two first order factors endorsement influence ( $\beta = 0.332$ ,  $p < 0.001$ ) and peer imitation ( $\beta = 0.739$ ,  $p < 0.001$ ) contribute significantly in evaluating social influence as the second order factors. Finally, the results indicates that the reflective second order factor carnival is effectively assessed with three first order indicators, participation ( $\beta = 0.844$ ,  $p < 0.001$ ), interaction ( $\beta = 0.865$ ,  $p < 0.001$ ), and playfulness ( $\beta = 0.89$ ,  $p < 0.001$ ).

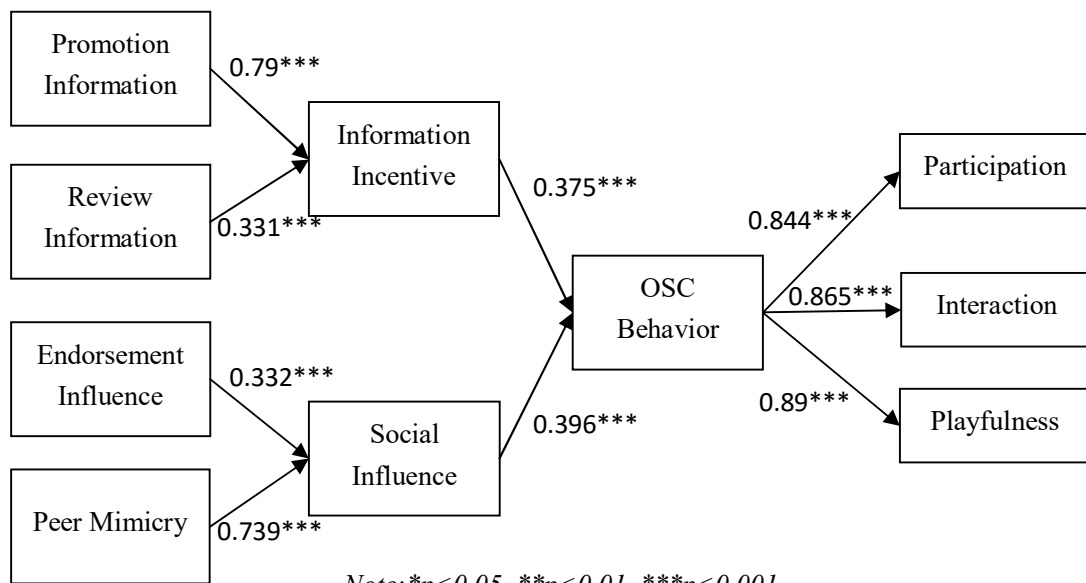


Figure 2: Structural Model

### DISCUSSION AND CONCLUSION

In order to explore the successful model of OSC that is mainly boosted by the power of herd behavior, this study aims to investigate the critical factors facilitating herd behavior, explain the herding process, and provide knowledge to the manifestation of typical OSC herd behavior. Building on the theory of carnival and the features of OSC, we firstly identified participation, interaction and playfulness as the three reflective indicators of OSC behaviors. The empirical results suggest participation, interaction, and playfulness almost equally and significantly contribute to assess and reflect OSC behavior, which is supported by the theory, indicating these three sub-constructs as indispensable and key features of OSC behavior.

Refining from Sun (2013), we next examined two constructs (H1) information incentive (e.g. promotion information, review information) and (H2) social influence (e.g. peer mimicry, endorsement influence) as the preconditions of herd behavior. Hypothesis 1 is strongly supported as expected. The result is congruent with prior findings which suggest when people use the information from external sources, such as use review information (e.g. star ratings, product evaluation) to indicate the quality of a product/online store/activity, online herd behavior occurs [24][40]. Therefore, the result suggests that information influence from external sources can enhance potential participants' confidence in their beliefs to herd in OSC behaviors. Similarly, the hypothesis 2 is supported by the empirical data. The result is consistent with prior studies which suggest that others action serves as an inference of the value of a product/service, and a heuristic of social proof, which lead people to imitate others decision, and perform the herd behavior [35][65].

Finally, as shown in Fig 2, the results indicate that information incentive and social influence contribute almost equally to predict herd in OSC behavior. In addition, as two dimensions of information incentive, the promotion information is a stronger indicator perceived by OSC participants, while review information is also a significant sub-construct. The result fits to our expectation, since the promotion campaign delivered the very attractive information which makes OSC special and valuable to participants, such as the lowest price of the year, novel and entertaining shopping games, and the personalized homepages. Meanwhile, endorser influence and peer imitation contribute significantly in evaluating social influence. Evidently, peer imitation is a more critical sub-construct perceived by OSC participants in evaluating social influence than social influence perceived.

#### Theoretical Implication

Prior studies have extensively investigated how the individual's own beliefs regarding certain product/service determine their behavior/intention (e.g. TAM UTAUT). Instead of merely considering the effect of individual's own private beliefs, taking the perspective of herd behavior, this study compensates the existing literature by examining how the herding process and preconditions drive the OSC behaviors.

This study argues that people are uncertain of their decision when they lack of information to accurately evaluate the consequences of their behavior. Then, people would like to conduct a herd behavior, through the process of following the lead and suggestion from other reliable information sources and imitating others' behavior they observed. This study provides direct empirical evidences to this point of view: information incentives representing the information from reliable resources and social influence capturing the imitation of others' behavior are all critical factors to perform herd behavior. This study explains how the herd behavior happens under which conditions, filling the gaps of "the cognitive process of herd behavior and the preconditions of herd behavior have been rarely investigated in IS field" [65]. Moreover, this study specifically identified and

explored the significance of the different critical information sources (e.g. promotion information, review information) and the identities of predecessors (e.g. peer mimicry, endorsement influence) in influencing the herding of OSC behavior, which adds more knowledge to the essence of the precondition of herd behavior in OSC.

The second contribution is made by integrating the perspective of theory of carnival and extracting the distinct OSC behaviors usually performed and herded by OSC participants. To the best of our knowledge, it makes this study one of the pioneers to conduct the analogy of OSC and traditional carnival. This study indicates that the global online shopping carnival reflects the real world carnival. People conduct behaviors with similar features, called participation, interaction, and playfulness. Thus, the explanatory power of the theory of carnival is extended to the context of e-commerce.

### Practical Implication

The findings of our study reveal that herd behavior exerts significant effect on people's decision of the OSC behaviors. Boosting the antecedents of herd behavior can effectively induce individuals to participate OSC. Firstly, practitioners should distribute the information containing strategies of price reduction to the customers, via Internet and many digital channels, as well as TV shows. Moreover, practitioners may present the prior users' purchase experience to customers: such as sales volumes, since demand for a product increases when consumers believe that more people have purchased that product; star ratings and recommendation can be used as cues to infer the actual performance of certain product, since such strategies have compensate need for evaluating the outcome of actual usage.

People would like to follow and imitate a specific group of people. Thus, firstly, the practitioner should positively advertise the OSC endorsers who may create profound social influence regarding the OSC, such as experts, celebrities, fashion leaders, pop stars. Moreover, an individual observe and mimic the people in his/her reference group. Practitioner can initiate programs to reward the customers who recommend the OSC/product/service products to their social networks. And practitioners should design the OSC activities which enable an individual to spread the information regarding his/her dynamic progress in OSC via the social networks.

### Limitation and Future Study

Though this study aims to provide some new knowledge to the OSC participants' herd behavior, this study has some limitations which also represent opportunities for further research. Firstly, this study only collected data from the participants of OSC organized by Alibaba group in China. Thereby, it is not clear to what extent the results can be generalized into other area or in a different culture. It would be interesting to find out how the culture influences participants herding behavior. Secondly, this study only investigated two types of antecedents of herd behavior. It worth discussing whether there are more predictors, and how they are related. Thirdly, future research could examine the influence of demographic information (gender, age, income). The investigation of how the people with different gender or age perform differently in herd behavior in OSC would provide several insights to the literature.

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