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A Test of the Measurement Validity of the Resistance to Change Scale in Russia and Ukraine

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The authors developed a Russian-language version of Oreg's (2003) Resistance to Change (RTC) Scale, a multidimensional dispositional measure of an individual's tendency to avoid or resist change, and tested its generalizability to the post-Soviet context with data from Russia and Ukraine. Confirmatory factor analysis results indicated a lack of configural consistency for the cognitive rigidity subscale, and post hoc examination suggested an unintended frame of reference for the cognitive rigidity items. The other three subdimensions of the scale—routine seeking, emotional reaction, and short-term thinking—were measurement-invariant in the two countries, providing a psychometrically acceptable measure of individual resistance to change. As a result, this respecification of the RTC Scale should be useful for much needed research devoted to individual resistors to change in the post-Soviet context, an effort essential for understanding obstacles to organizational change, and for generating prescriptive guidelines in a situation where most organizations are pressed by transition-induced need for systemic change and development.

Keywords: *resistance to change; dispositional measure; measurement validity; Russia; Ukraine*

Resistance to change (RTC), a widely accepted mental model in organizational science (Dent & Goldberg, 1999a), has been the subject of considerable interest over the past half century because of its potential to undermine firm performance by disrupting important organizational development efforts. Yet conflicting views of the RTC construct have resulted in a lack of consensus in how resistance is defined and measured, particularly at the individual level of analysis. Western scholars still debate the change dynamic (cf. Dent & Goldberg, 1999a, 1999b; George & Jones, 2001; Piderit, 2000), but the need to understand change processes in general, and

individual RTC in particular, is acutely salient in organizations operating in countries undergoing historic transformations in their political, economic, and cultural systems. Managers and employees in these transition economies, including those working for multinational firms (Michailova, 2000), are struggling to overcome inefficient organizational paradigms of the past to develop more globally competitive processes and systems. Consequently, it is crucial to examine issues associated with organizational change in transition settings.

Previous approaches to addressing RTC have primarily focused on situational antecedents such as power dynamics (Goltz & Hietapelto, 2002); participation (Coch & French, 1948; Lines, 2004); job security (Rosenblatt, Talmud, & Ruvio, 1999) or organizational culture (Trade-Leigh, 2002); and various traits, for example, locus of control and self-efficacy, related to an individual's ability to cope with change (Judge, Locke, & Durham, 1997; Judge, Locke, Durham, & Kluger, 1998; Judge, Thoresen, Pucik, & Welbourne, 1999) and to accept change initiatives (Wanberg & Banas, 2000). Yet these studies utilized instruments designed to measure individuals' reactions to specific change situations, not their generalized responses to change. Given the potential importance of RTC as a personality trait, Oreg (2003) developed an individual measure of RTC that directly measures an individual's tendency to avoid or resist change, which is paramount to understanding individual differences and their consequences for organizational change in transition contexts.

Oreg (2003) provided evidence supporting the validity of the RTC Scale with multiple samples, primarily drawn from a university in the United States. More recently, Oreg et al. (2008) provided evidence of the scale's measurement properties in 16 non-U.S. samples of students. Such efforts at determining the cross-cultural validity of measurement, to ensure that respondents from culturally diverse samples use the same conceptual frame of reference in responding to items on a given scale, are prerequisite to meaningful cross-national conclusions (Riordan & Vandenberg, 1994). The RTC Scale, however, has not been examined in Russia or Ukraine, or in samples of employees in the countries of the former Soviet Union, which pose a marked contrast to the West in their historical, cultural, institutional, and economic perspectives as a result of a dramatically different institutional paradigm. Consequently, there are questions about the suitability of Western measures in the former Soviet Union, where economic transition exacerbates the need for organizational change, and where interpretations of change cannot be assumed to be the same as in the West. Therefore, given the promise of the RTC Scale, the fundamental purpose of this study is to develop a Russian-language version of the questionnaire and to examine its measurement validity by undertaking a detailed assessment of the structural properties of the RTC Scale in Russia and Ukraine. These two countries, which share a Slavic heritage, were the epicenter of Soviet industrial activity and are now the largest and most influential economies in the former Soviet Union.

The Resistance to Change Scale

Accumulating knowledge concerning RTC has been hampered by a unidimensional understanding of individuals' overall reactions to change (George & Jones, 2001). Consequently, Piderit (2000) proposed that employees' thoughts, behaviors, and feelings about change may not coincide, and therefore RTC should be viewed as a multidimensional attitude toward change composed of cognitive, affective, and behavioral components. Consistent with Piderit's multidimensional conceptualization of the construct, Oreg (2003) specifically described the RTC Scale as a dispositional measure "designed to tap an individual's tendency to resist or avoid making changes, to devalue change generally, and to find change aversive across diverse contexts and types of change" (p. 680). Although the four factors in the RTC Scale—routine seeking, emotional reaction, short-term thinking, and cognitive rigidity—are not entirely independent (e.g., what individuals think about change will likely influence how they feel about change and how they intend to behave in response to change), the components are distinct dimensions that "can be conceptualized as reflecting behavioral, affective, and cognitive aspects of RTC, respectively" (p. 683). The principal distinction between the RTC Scale and other instruments used to assess reactions to change is that Oreg's conceptualization focuses on an individual's disposition toward change, an aspect of personality, rather than an attitude toward a specific change situation.

Researchers have used the RTC Scale to study reactions to change. Specifically, Oreg (2006) explored organizational restructuring in a defense company wherein individuals high in RTC were less likely to initiate change and were more likely to hold negative attitudes toward change initiatives. Nov and Ye (2008) found RTC to be a significant predictor of perceived ease of use of digital library technology among students at a U.S. university; and Naus, van Iterson, and Roe (2007) found the interaction of rigidity, as conceptualized by Mudrack (2004), and role conflict to be a significant predictor of employees' inclination to leave the organization in a study of organizational cynicism in a Dutch trade union. Notably, Naus et al. used only two of Oreg's (2003) RTC items to measure rigidity, defined as behavioral consistency, rather than as a cognitive dimension as advanced by Oreg.

Resistance to Change in the Post-Soviet Era

Since the dissolution of the Soviet Union in 1991, considerable sums have been spent on education and training programs designed to modernize the antiquated system of management in post-Soviet states (Aganbegyan, 2004; Kozlova & Puffer, 1994; May, Bormann-Young, & Ledgerwood, 1998). Yet despite the concerted efforts of academics, consultants, and executives from around the world, the effective transfer and integration of management knowledge to the former Soviet states, most notably Russia and Ukraine, have often been stymied by resistance to new

knowledge from "outsiders" and by an unwillingness to enact new knowledge into daily operations and work routines (May, Puffer, & McCarthy, 2005; Michailova & Husted, 2003; Michailova & Hutchings, 2006). RTC in the region has a long history, as Peter the Great lamented in the early 18th century that "anything that is new, even if it is good and necessary, our people will not do without being compelled" (Massie, 1981, p. 773). Given that multilevel, transformative change is ultimately the responsibility of individual actors (Rosenberg, 1995; St. John, 2005), individual dispositions, cognition, and attitudes toward change are essential for investigation in post-Soviet organizations.

Cross-cultural research suggests that the meanings and practices of cultural contexts are interdependent with dispositions, which develop through individuals' active involvement in various social worlds (Markus & Kitayama, 1998). Moreover, individuals' participation in shared cultural narratives may result in beliefs, values, and psychological attributes that are similar among individuals within a culture but may differ from individuals in other cultures (Cheung, Leung, & Au, 2006). Our focus here is on individual differences in different cultures, which is not the same as comparing aggregate differences between cultures (Cheung et al., 2006). Yet the degree to which individual dispositions are manifested in a given culture depends on the behavioral variance permitted via the social norms and sanctioning within the culture (Gelfand, Nishii, & Raver, 2006), a phenomenon particularly notable in the countries of the former Soviet Union, where the communist system that demanded conformity has given way to more latitude in expressing individual dispositions, attitudes, and behaviors. Consequently, this environment would now seem more conducive to the assessment of individual differences and to how the lingering Soviet legacy may influence individuals' perceptions of RTC and other change-related considerations.

Given Oreg's (2003) conceptualization of RTC as a multidimensional construct, we believe that the RTC Scale is particularly appealing for research in the post-Soviet context because of the theoretical and cultural relevance of each of the proposed underlying factors. The first factor of the scale, routine seeking, refers to an inclination to adopt routines. During the centralized Soviet period, routine and conformity, emanating from a plethora of rules and regulations, characterized organizational life. Moreover, routine tasks and processes provided a refuge in which workers could avoid being singled out from the collective (Michailova, 2000). Russian and Ukrainian executives still often exhibit a penchant for adopting routines in hopes of solving complex problems with formulaic solutions imported from the West (May et al., 1998), a tendency associated with a reluctance to forgo familiar knowledge and routines to accept and adapt new knowledge, skills, and practices needed in their particular context (May et al., 2005). Thus, the history of the Soviet Union suggests that the concept of routine seeking should be meaningful as an element of RTC in the current context, which, if confirmed, holds promise for research examining individuals' reactions to disruptions in routines inherent in large-scale reform.

The second factor in Oreg's (2003) scale, emotional reaction to imposed change, is an indicator of the amount of uneasiness and stress experienced by an individual when confronted with change. Change-induced stress was limited during the Soviet period because change in the centralized system proceeded at a glacial pace. Most people lived their entire lives in the same state-subsidized apartment in the same city in which they were born. After obtaining technical or university training, in which they had limited choice, they were usually assigned to a specific enterprise and guaranteed employment for life, and they were "protected" by the parental approach of the director general, the Soviet equivalent of CEO (Vlachoutsicos & Lawrence, 1990). More recently, without the same directives, life has clearly become more stressful for the average Russian or Ukrainian, as evidenced by the rise in corruption (Segura et al., 2006), alcohol and drug abuse (Koshkina, 2003), and suicides (TurkishPress.com, 2006) and a decrease in life expectancy (Puffer, McCarthy, & Wilson, 2007; Rodriguez, 2005). Thus, we would expect this emotional component of RTC to be relevant in the current environment as individuals are now less insulated from the consequences of disruptive systemic change.

Oreg's (2003) third factor, short-term thinking, (i.e., resistance to rational long-term benefits), has been evident in the region since tsarist times. During the Soviet period, executives lived in a paradox whereby, even though they operated in a "planned economy," they actually had very little interest in long-term planning at the organization level and considered it basically useless (Michailova, 2000). Instead, Soviet citizens typically preferred short-term tasks and planning horizons, rather than longer term commitments that might be fraught with uncertainty and unpredictability (Mikheyev, 1987). In a study from the late 1990s, a Russian CEO of a multinational company jointly owned by Western shareholders and the Russian government indicated that his time frame for thinking and acting was 24 hours, whereas Western expatriates in the same company reported their time frame as being as long as 10 years (Michailova, 2000). Thus, it would be useful to examine this element of RTC as the basis for future research exploring how individual differences may influence attitudes and behavioral outcomes required for successful organizational reform in this transition context.

The fourth factor, cognitive rigidity, is germane to resistance in the post-Soviet context because, prior to the collapse of the Soviet regime, independent, critical thinking (i.e., cognitive flexibility) was typically repressed and even severely punished (Michailova & Husted, 2003). Moreover, given the expectation of unquestioning compliance (Michailova & Husted, 2003), independent thinkers were considered to be conflict-prone, antisocial personalities or even "enemies of the people" (Ivancevich, DeFrank, & Gregory, 1992). In light of the vestiges of the Soviet past, we suggest that understanding the conceptual relevance of cognitive rigidity/flexibility as part of an individual's disposition, which can now be more freely expressed, is relevant to facilitating needed organizational change in the transition economies of Russia and Ukraine.

Given the relevance of Oreg's (2003) four factors to the cultural context of the former Soviet system, we believe that there are potentially valuable insights to be gained from the use of the RTC Scale in organizational change research in this region if the instrument evinces acceptable measurement properties. We follow with a test of the measurement properties of the RTC Scale, first separately in Russia and Ukraine, and then in tandem.

Method

Participants and Procedures

Lack of access to research sites and respondents is a formidable obstacle to conducting research in the post-Soviet states. Openness is often considered to be inappropriate behavior in these societies, where the Soviet regime fostered a culture of secrecy and suspicion (Michailova, 2000), such that individuals are very reluctant to share information with outsiders (McCarthy, Puffer, Vikhanski, & Naumov, 2005), particularly Westerners (Michailova & Husted, 2003). To overcome this barrier to data collection, we relied on a network of Russian and American academicians, practitioners, and consultants, developed over two decades, who have built trust with local managers to secure the cooperation of the Russian and Ukrainian companies for our research efforts. In response to a direct request by a trusted insider on our behalf, the CEOs (directors general) of two private companies, one in Russia and one in Ukraine, agreed to participate in the study. Their acceptance was, however, conditioned on the stipulations that their firms remain anonymous and that no demographic information on individuals could be collected. Both of these constraints are common barriers to conducting research in emerging economies (Hoskisson, Eden, Lau, & Wright, 2000; Tan & Peng, 2003; Wright, Filatochev, Hoskisson, & Peng, 2005) and are indicative of the continuing Soviet pattern of restricting information. Potential concern about the lack of individual demographics for examination is alleviated by the fact that Oreg (2003) found no significant age, gender, or occupational status differences in mean item scores or in the RTC Scale factor structure, resulting in no a priori basis for expecting demographic effects that produce measurement variations across groups.

Sample 1: Russia. The Russian sample consists of employees of a privately owned supermarket chain with headquarters and five stores located in the Novosibirsk region. Forty-four percent of the firm's employees were male, with an age distribution of 23% age 30 and under, 35% from 31 to 39, 27% from 40 to 49, and 15% age 50 and over. Fifty-nine percent of employees held a university degree.

We delivered the survey instrument electronically to the firm's human resource management (HRM) department, where representatives printed hard copies and

distributed them to each employee along with a written request from the director general to participate. Employees deposited their anonymous completed surveys in collection boxes placed at a central location in each store or at headquarters. The HRM staff collected the surveys a week later and mailed them to us in the United States. Of the 983 employees asked to participate, 558 returned surveys, and 540 provided complete, usable data, resulting in an effective response rate of 55%.

Sample 2: Ukraine. The second sample is composed of employees of one of the largest, as measured by total revenues, private insurance companies in Ukraine. Thirty-six percent of the firm's employees were female, and the workforce had the following age distribution: 20% age 30 and under, 34% from 31 to 39, 32% from ages 40 to 49, and 14% age 50 and over. Eighty-five percent of all employees had a university degree. The data collection procedure was similar to the process used in the Russian firm, thereby enhancing the comparability of samples (Schaffer & Riordan, 2003). Of the 797 employees targeted for participation, 425 returned questionnaires, and 420 provided complete and usable data, for an effective response rate of 53%.

Measure

Using exploratory and confirmatory factor analysis, Oreg (2003) produced a four-factor, 17-item solution, which exhibited structural consistency and discriminant, convergent, concurrent, and predictive validity across six independent samples drawn from faculty, staff, and students at a large northeastern U.S. university and a seventh sample that, according to Oreg et al. (2008), was nationally mixed, with a majority of U.S. participants. The scale follows a Likert-type format of *strongly agree* to *strongly disagree*, with the RTC score computed as the mean of all items in the direction of resistance. The items, along with their standardized pattern coefficients and structural coefficients reported by Oreg (2003) on the second-order RTC factor, which represents the overall or total RTC score**,** are shown in the first two columns of Table 1. Oreg demonstrated convergent and discriminant validity of the RTC Scale scores using data from instruments on change-related variables such as risk aversion (Slovic, 1972), sensation seeking (Zuckerman & Link, 1968), and tolerance for ambiguity (Budner, 1962). Additionally, Oreg (2003) reported that RTC scores predicted changes in student schedules, resistance to try new products, and inclinations to initiate voluntary changes, thereby providing evidence of the concurrent and predictive validities of the scale. More recently, Oreg et al. (2008) examined the equivalency of the RTC Scale across a total of 4,201 undergraduate college students from 17 countries. The results were generally confirmatory, but negatively worded items and the cognitive rigidity subscale in three countries were problematic, suggesting the potential for differences in the interpretation of the construct across cultures.

Table 1
Standardized Parameter Estimates Across Studies for the Resistance to Change (RTC) Scale

No.	Dimension/Item	Oreg (2003) Estimates: United States	Four-Factor Estimates		Three-Factor Estimates	
			Russia	Ukraine	Russia	Ukraine
	Routine seeking	.809[a]	.897[a] (5.94)[b]	.708[a] (5.62)	.899[a] (5.92)	.707[a] (5.62)
1.	I generally consider changes to be a negative thing.	.747	.662 (—)	.551 (—)	.661 (—)	.551 (—)
2.	I'll take a routine day over a day full of unexpected events any time.	.679	.288 (5.60)	.399 (6.19)	.289 (5.61)	.399 (6.19)
3.	I like to do the same old things rather than try new and different ones.	.626	.566 (10.02)	.628 (6.47)	.566 (10.02)	.628 (8.34)
4.	Whenever my life forms a stable routine, I look for ways to change it.[c]	.539	.201 (3.96)	.392 (5.25)	.200 (3.94)	.393 (6.11)
5.	I'd rather be bored than surprised.	.475	.440 (8.20)	.647 (6.53)	.442 (8.22)	.647 (8.45)
	Emotional reaction	.910[a]	.842[a] (—)	.809[a] (—)	.838[a] (—)	.809[a] (—)
6.	If I were to be informed that there's going to be a significant change regarding the way things are done at work, I would probably feel stressed.	.715	.795 (6.61)	.768 (7.35)	.795 (6.59)	.768 (7.35)
7.	When I am informed of a change of plans, I tense up a bit.	.692	.320 (—)	.402 (—)	.319 (—)	.402 (—)
8.	When things don't go according to plans, it stresses me out.	.663	.690 (6.50)	.713 (12.49)	.689 (6.48)	.713 (7.23)
9.	If my boss changed the criteria for evaluating employees, it would probably make me feel uncomfortable even if I thought I'd do just as well without having to do any extra work.	.414	.421 (5.61)	.572 (10.36)	.422 (5.61)	.572 (6.71)

(continued)

Table 1 (continued)

No. Dimension/Item	Oreg (2003) Estimates: United States	Four-Factor Estimates		Three-Factor Estimates	
		Russia	Ukraine	Russia	Ukraine
Short-term thinking	1.210[a]	.928[a] (5.60)	.995[a] (5.65)	.930[a] (5.59)	.995[a] (5.71)
10. Changing plans seems like a real hassle to me.	.665	.606 (9.39)	.632 (9.14)	.610 (9.33)	.633 (9.14)
11. Often, I feel a bit uncomfortable even about changes that may potentially improve my life.	.494	.643 (9.67)	.711 (10.79)	.644 (9.59)	.711 (9.73)
12. When someone pressures me to change something, I tend to resist it even if I think the change may ultimately benefit me.	.460	.412 (7.28)	.449 (7.62)	.414 (7.26)	.449 (7.21)
13. I sometimes find myself avoiding changes that I know will be good for me.	.381	.529 (—)	.560 (—)	.523 (—)	.560 (—)
Cognitive rigidity[d]	.540[a]	–.194[c] (-2.55)	.013[c] (.17)	—	—
14. I often change my mind.[e]	.831	.544 (5.42)	.374 (3.67)	—	—
15. Once I've come to a conclusion, I'm not likely to change my mind.	.569	.394 (—)	.444 (—)	—	—
16. I don't change my mind easily.	.556	.350 (4.62)	.496 (3.79)	—	—
17. My views are very consistent over time.	.291	.592 (5.37)	.370 (3.65)	—	—

a. Estimates for the coefficients on the second-order RTC factor all statistically significant at $p < .001$.
b. Critical ratios provided in parentheses where parameter not set to unity. *Z* scores were not reported by Oreg (2003).
c. This coefficient is statistically significant at $p < .05$ in Russia but not in Ukraine ($p = .866$).
d. Factor omitted for the three-factor estimates in Russia and Ukraine.
e. These items were reverse-coded for analysis.

Translation of Instrumentation

Following the recommendations of Schaffer and Riordan (2003), we drew on the combined skills of bilingual and bicultural members of our research team to help increase the certainty of establishing semantic equivalency in the Russian version of the RTC Scale. All items were translated from English into Russian, in which the Ukrainian respondents are also fluent, and then independently back-translated into

English by another individual who is a native Russian speaker with 10 years of formal training in English at Specialized School #9 for English Language in Moscow, one of the top three English language institutes in the former Soviet Union. This individual currently works as a professional consultant both in the United States and in the countries of the former Soviet Union, providing a familiarity with the intricacies of the research context (cf. Ryan, Chan, Ployhart, & Slade, 1999) considered advantageous for translation in cross-cultural research (Schaffer & Riordan, 2003). After the initial back-translation, this individual and one of the authors carefully reviewed every item on the scale, thereby providing the recommended combined perspectives of a cultural insider and an outsider that enhance the likelihood of obtaining equivalency across languages and cultures (Schaffer & Riordan, 2003). Once the back-translation was complete, four additional bilingual Russian experts who routinely conduct management training in Russian firms examined English and Russian versions of the instrument and were asked to identify any instances in which linguistic equivalency might be improved. Based on their reviews, one minor change was made to the wording of a single item prior to the distribution of the survey.[1]

Analysis and Results

We used confirmatory factor analysis (CFA) to examine the measurement validity of the RTC Scale because the technique is appropriate for the examination of multifactor Likert-type scales (Robert, Lee, & Chan, 2006). The assumptions for CFA are met for this analysis (cf. West, Finch, & Curran, 1995), as the data distribution indicated no serious problems with skewness or kurtosis in the Russian (skewness = .16, standard error = .10; kurtosis = .06, standard error = .21) or Ukrainian (skewness = .21, standard error = .12; kurtosis = .55, standard error = .24) samples. Moreover, the normality of the data distribution serves as a preliminary indicator of the scalar congruency of the instrument, as cultural response sets (cf. Robert et al., 2006) would suggest a platykurtic distribution in the case of extreme response sets (tendency to answer at the extremes of the scale) and a skewed distribution if acquiescence response sets (tendency to use either low or high ends of the scale) were pronounced. Neither circumstance was evident in the data.

The measurement model presented by Oreg (2003), including four first-order factors (routine seeking, emotional reaction, short-term thinking, and cognitive rigidity), the respective items associated with each factor, and the expectation that the parameter estimates for the four factors would be significantly related to a second-order RTC factor representing the overall construct of RTC, served as the a priori model for testing the configural generalizability of the Russian version of the RTC Scale. We used maximum likelihood estimation, which is reasonably robust across analytic conditions (Hoyle & Panter, 1995), to conduct the confirmatory factor analysis with AMOS, and examined multiple fit statistics to assess the resulting

Table 2
Resistance to Change (RTC) Scale Dimension Intercorrelations in U.S., Russia and Ukraine for Four Factor Model

	United States[a]			Russia			Ukraine		
Dimension	1	2	3	1	2	3	1	2	3
1. Routine seeking	—			—			—		
2. Emotional reaction	.65**	—		.75***	—		.57***	—	
3. Short-term thinking	.57**	.52**	—	.84***	.78***	—	.71***	.80***	—
4. Cognitive rigidity	.23**	.11**	.21**	–.14	–.21**	–.15*	.13	.00	.00

a. Correlations in United States from Oreg (2003), who reported all correlations statistically significant at $p < .01$.
*$p < .05$. **$p < .01$. ***$p < .001$.

models. We included the ratio of chi-square to degrees of freedom (*df*), a relative measure that is preferable to relying solely on the chi-square statistic (cf. Arbuckle, 2005) due to its hypersensitivity to trivial model-data differences within a large sample (Wu, Li, & Zumbo, 2007). Following the advice of Hu and Bentler (1995), we also used the goodness-of-fit index (GFI), the comparative fit index (CFI), and the root mean square error of approximation (RMSEA) to systematically and comprehensively examine the fit of the confirmatory factor analytic model.

When we applied the hypothesized four-factor specification of RTC to the data from Russia, the results, $\chi^2(df = 115, N = 540) = 358.15$ ($p < .001$, GFI = .93, CFI = .84, RMSEA = .06, $\chi^2/df = 3.11$), suggested concerns that the Russians' conceptualization of the constructs differs from that reported by Oreg (2003). The CFI fell short of the recommended cutoff of .90 (cf. Arbuckle, 2005; Hu & Bentler, 1995). In probing the lack of configural consistency, we compared the parameter estimates to the factor structure results reported by Oreg (2003). As shown in Table 1 for the four-factor model, although all of the items had statistically significant pattern coefficients in the Russian data comparable to Oreg's results, and the lowest pattern coefficient was .201, there are variations from expectations with the correlations among the factors. Specifically, Oreg found significant positive correlations among all four of the RTC factors in the U.S. samples, but those relationships did not hold in the Russian data, as displayed in Table 2. Instead, the relationships between cognitive rigidity and the other dimensions of RTC were either not statistically significant or, when they were, produced a negative association. Oreg et al. (2008) reported that the lowest correlations among the four RTC subscales in their 17-country study were between cognitive rigidity and the other three factors, but they did not provide

factor correlation statistics for each country in their sample. Additionally, as shown by the parameter estimates in Table 1, cognitive rigidity was significantly negatively correlated with the second-order RTC factor in Russia.

Rather than relying solely on the Russian data for testing the measurement model, we used additional data from Ukraine, a country that shares the cultural, linguistic, political, and economic heritage of Russia via decades of inclusion in the Soviet Union but is undergoing distinctive change in its political, legal, and economic domains. This approach has two advantages. First, it adheres to the guidelines of Thompson and Daniel (1996) concerning using another independent sample to test a rival model. Additionally, by examining the RTC factor structure with a second sample from the same cultural context, it is possible to draw inferences concerning whether the failure of the four-factor model in the sample from Russia was country-specific or consistent with broader underlying cultural effects that do not necessarily conform to geographic borders (Schwartz, 1999).

The fit of the global four-factor model to the Ukraine data, $\chi^2(115, N = 420) = 231.54$ ($p < .001$, GFI = .94, CFI = .91, RMSEA = .05, $\chi^2/df = 2.01$) was better than in the Russian sample. As shown in Table 1, although all of the items significantly loaded on their respective factors, not all of the factors significantly loaded as expected with the global latent factor. Again, cognitive rigidity did not perform as hypothesized, showing no relationship with the second-order RTC construct in the sample from Ukraine. Table 2 shows that cognitive rigidity failed to significantly correlate with the other three factors in the Ukraine data.

Contrary to Oreg's (2003) findings in the United States, the four-factor specification of the RTC Scale does not hold in the samples from Russia or Ukraine. These results raise questions about the generalizability of the cognitive rigidity factor to employees in the former Soviet Union, as cognitive rigidity did not produce the requisite overlap of the higher order RTC construct space. Notably, Oreg et al. (2008) reported that the cognitive rigidity factor also failed to load on the second-order latent factor in 3 of the 17 countries—Greece, Slovakia, and the United Kingdom—and produced the lowest correlation with the RTC composite score in Oreg's studies (2003) but performed as expected in the other samples.

Given that the three remaining factors—routine seeking, emotional reaction, and short-term thinking—produced highly significant estimates in relation to the second-order latent RTC factor, we examined a rival three-factor solution, wherein we excluded the cognitive rigidity items from the measurement model. The results suggest that the three-factor model provides the superior specification of the measurement model, as the results in Russia, $\chi^2(62, N = 540) = 189.85$ ($p < .001$, GFI = .95, CFI = .90, RMSEA = .06, $\chi^2/df = 3.06$); and in Ukraine, $\chi^2(62, N = 420) = 130.58$ ($p < .001$, GFI = .95, CFI = .94, RMSEA = .05, $\chi^2/df = 2.11$), produced better fit to the data than did the hypothesized four-factor solution. Again, all of the items loaded significantly on their respective factors, and as shown in Table 1, all three factors were highly significant in their loadings on the global RTC latent variable. Thus, the

results from both countries indicate that all three of the factors represent dimensions that converge on the RTC construct.

After these preliminary tests, we used the multigroup confirmatory factor analysis (MGCFA) application in AMOS to test the revised RTC measurement model in Russia and Ukraine, an approach superior to separate analyses for each data set (Arbuckle, 2005; Byrne, 2004). There is ongoing debate as to whether the sequence of CFA tests of measurement invariance, which necessitates that test scores from different countries or cultures measure the same construct on the same metric (Wu et al., 2007), should begin with the most restrictive model or the least restrictive model, followed by increasing stringency in each subsequent test (Stein, Lee, & Jones, 2006). Given the theoretical expectation that the two independent samples from the post-Soviet context would converge on a single measurement model, we adopted the more restrictive approach in our initial test, as advocated by Vandenberg and Lance (2000). In doing so, we examined the homogeneity of the variance–covariance matrix structure, which provides a rigorous omnibus test of equivalence, because the test of equality between the matrices requires that all covariances are equal. The results, provided in Table 3 under Model 0, provide strong evidence of invariance. Although chi-square is statistically significant, the chi-square–to-*df* ratio is acceptable, and all of the other fit indices are highly satisfactory. Therefore, every parameter is essentially equal in the structural model. We proceeded with further invariance tests in a hierarchical test of nested models only because of the statistical significance of the chi-square in the test of the equivalence of the variance–covariance matrix across groups.

We examined the resulting series of nested models, also shown in Table 3, with multiple indicators, including the aforementioned fit statistics for assessing model fit, particularly the RMSEA, which compensates for the complexity of the model and sample size (Browne & Cudeck, 1993), and also included indicators of incremental fit for the series of nested models. Notably, we did not include change in RMSEA values between nested models, as there are questions about the sampling distribution and no generally accepted standard cutoff values for such a measure (Cheung & Rensvold, 2002). Although we provide the chi-square statistic as an indicator of model fit, and the change in chi-square statistic as an indicator of incremental fit for each model, there is evidence that the change in chi-square is problematic for comparing nested models because the often cited sample size influences inherent in chi-square tests are echoed in the change in chi-square statistic as a test of the relative fit of two nested models (Cheung & Rensvold, 2002). Therefore, we also used the change in CFI as a comparative measure of fit relative to the null model, one recommended by Cheung and Rensvold (2002) as a robust test of between-model invariance in a nested series of models. Specifically, Cheung and Rensvold counseled that a change of CFI smaller than or equal to –.01 indicates that the null hypothesis of invariance should not be rejected.

A test of configural equivalence (Model 1), which tests the null hypothesis of the same factor structure in the two groups, of the three-factor model using unconstrained

Table 3
Results for the Sequence of Measurement Invariance Tests for the Resistance to Change (RTC) Scale

Model	*df*	χ^2	χ^2/df	Δdf	$\Delta\chi^2$	RMSEA	CFI	ΔCFI	GFI
M_0: invariant variance–covariance matrices	91	149.08***	1.64	—	—	.03	.98	—	.98
M_1: configural invariance (same factor structure)	124	320.43***	2.58	—	—	.04	.920	—	.95
M_2: metric invariance (equal pattern and structural coefficients)	134	344.64***	2.57	10	24.21**	.04	.914	–.006	.95
M_3: residuals invariance (equal error variances)	140	351.66***	2.51	6	7.02	.04	.913	–.001	.95

Note: RMSEA = root mean square error of approximation; CFI = comparative fit index; GFI = goodness of fit index.
**$p < .01$. ***$p < .001$.

multigroup analysis produced an acceptable fit to the data. Moreover, as shown in the right-hand columns of Table 1, all of the items produced statistically significant pattern coefficients associated with the hypothesized factors, and all three of the factor estimates were highly statistically related to the second-order RTC factor. Additionally, in both countries, all three of the factors were highly correlated, as shown in Table 4, demonstrating convergence on the RTC construct space. The results support configural equivalence across the two samples, suggesting that the respondents in both countries used the same conceptual frame of reference in responding to the test items. With the evidence of configural invariance, we proceeded with tests of metric invariance with the two data sets.

Model 2, which tests the null hypothesis of no differences in the pattern and structural coefficients between groups, used the same measurement specification as Model 1, but with the pattern and structure coefficients constrained to equality across the two groups. Although the change in chi-square is statistically significant, the RMSEA value and the change in the CFI support the null hypothesis of metric invariance; that is, there is no difference in the extent to which the respondents in the two groups viewed the items as indicators of their respective factor dimensions. Additionally, although there is debate about the necessity of testing the invariance of residuals, or error variance (cf. Byrne, 2004; Wu et al., 2007), we constrained the residuals in another nested model, Model 3, which tests the null hypothesis that the two groups have equal error variances. Chi-square was statistically significant, but the change in chi-square was not. Additionally, the RMSEA value and change in the

Table 4
Resistance to Change (RTC) Scale Dimension Intercorrelations in Russia and Ukraine for Three-Factor Model (Coefficient α Reliability Estimates)

	Russia			Ukraine		
Dimension	1	2	3	1	2	3
1. Routine seeking	(.55)[d]			(.63)[c]		
2. Emotional reaction	.75	(.61)[b]		.57	(.69)[a]	
3. Short-term thinking	.84	.78	(.63)[b]	.70	.80	(.67)[b]

Note: All correlations statistically significant at $p < .001$.
a. 95% confidence interval (CI) ± .09.
b. 95% CI ± .10.
c. 95% CI ± .11.
d. 95% CI ± .12.

CFI support the null hypothesis that the residuals are equivalent across the two groups, thereby supporting a conclusion of strict measurement invariance.

Overall, the results support configural and metric invariance of the rival three-factor version of the Russian RTC Scale in Russia and Ukraine. Notably, had we relied exclusively on chi-square tests, we would have rejected most of the null hypotheses of invariance. The Cronbach's alpha reliabilities for the modified RTC Scale scores, at the 95% confidence interval (CI) using the central *F* distribution, were .77 (95% CI: .74, .80) in Russia and .81 (95% CI: .78, .83) in Ukraine. Although the coefficient alphas for the subdimension scores, presented in Table 4, do not meet the often cited .70 threshold (Nunnally & Bernstein, 1994), it should be noted that the subscales have a limited number of items, thereby suppressing reliability; but collectively they produce sufficient score reliability in the RTC Scale composite measure. Subsequent reference to the RTC Scale is to the modified scale consisting of three factors.

Post Hoc Analysis

As a result of the lack of conceptual equivalence of the cognitive rigidity factor in both post-Soviet samples relative to the expected alignment with the overall construct of RTC found in other countries (Oreg, 2003; Oreg et al., 2008), we concluded that the findings from the structural analysis might be clarified by further investigation into the emic aspects of the target culture (Schaffer & Riordan, 2003). Following Vandenberg's (2002) suggestion, we sought an opportunity to obtain qualitative data that might help explain why the cognitive rigidity dimension did not load as expected on the second-order RTC factor. Several months after the collection of the quantitative data for this project, we gained access to a group of 16 Russian executives participating in a management training seminar in Moscow. Six of the executives,

none of whom were included in the aforementioned samples, agreed to participate in individual structured interviews conducted by a bilingual member of our research team. These executives, five males and one female, ranging in age from 38 to 55, held mid- to upper level management positions in different organizations. Each participant was given the four cognitive rigidity items from Oreg's (2003) RTC Scale and was asked, first, to identify what the questions were designed to measure and, second, what they perceived to be the overarching theme of the four questions. As an additional check on our translation procedures, the participants were also asked if any of the items could have been stated more clearly in the Russian language from grammatical or semantic perspectives and, if so, how? The data from the six interviews revealed no problems with translation but did provide preliminary clues as to why conceptual equivalency was not confirmed for the cognitive rigidity dimension of the RTC Scale.

Three of the participants stated that the items were about "formulating decisions on specific topics," "conservatism of opinions," and the "tendency of the person to change his opinion," suggesting an interpretation of the cognitive rigidity items as Oreg (2003) originally intended. The other three individuals, however, reported that the cognitive rigidity items concerned "defining the character of the person" and, when prompted further, elaborated on the issue of character with explanations such as "the weak person can be easily manipulated and influenced to accept foreign ideas" and "a strong person is resistant, guards the mind, and will not be easily swayed in his opinions." Overall, these participants appeared to be looking past cognitive rigidity to make broader value judgments about the items and how they do or do not represent perceptions about resistance. Importantly, decades of communist control shaped most individuals' frames of reference for what constitutes resistance. This legacy results in cognitive rigidity not necessarily being regarded as a form of resistance; rather, it may still be regarded as a form of compliance, associated with virtue and strength of character, a view completely counter to how cognitive rigidity/flexibility is viewed in the West.

In summary, by interpreting the items as measuring "the degree to which an individual is likely to be influenced by outside persons or events," this evidence, although admittedly limited, suggests that the cognitive rigidity items may have evoked a frame of reference of susceptibility to external control among some participants, an interpretation analogous to Rotter's (1966) external locus of control. Conversely, other respondents might have used an interpretation of the individual's being flexible or willing to change his or her mind, without any added value judgment or broader interpretation of the items, an interpretation that aligns more closely with Oreg's (2003) original conception of the construct. Although drawing definitive conclusions from such a small number of interviews is not possible, the data provide interesting suggestions about why the cognitive rigidity factor failed to correlate with the other three factors within the overall structure of the RTC measurement model.

Conclusions

Transition economies pose interesting contexts for the refinement and extension of theory, particularly concerning change, but interpretable research conclusions, particularly from cross-national comparisons, require first establishing conceptual comparability in measurement across cultures. The results from Russia and Ukraine suggested that three of the four factors of the RTC Scale—routine seeking, emotional reaction, and short-term thinking—produce an acceptable factor configuration. The MGCFA results indicate that the three-factor structure is measurement-invariant in Russia and Ukraine. The conclusion of conceptual equivalence of the three-factor model across the samples in Russia and Ukraine is consistent with the cultural, linguistic, religious, and economic similarities of the two nations, which share a common Soviet heritage and are undergoing historic institutional transformations.

Although relevant in Oreg's (2003) U.S. samples, and in most of Oreg et al.'s (2008) samples, the cognitive rigidity subdimension did not exhibit measurement validity in the Russian and Ukrainian samples. Initially, this evidence seemed somewhat counterintuitive to the expectation that cognitive rigidity would exhibit a meaningful connection to the higher order RTC construct, given the long histories of rigidity and forced conformity under Soviet domination. The post hoc qualitative results provided interesting suggestions concerning why the cognitive rigidity items of the RTC Scale did not consistently tap the intended construct space.

Partial conceptual validity does not warrant discarding the measure if there is minimal threat to the construct validity of the scores derived from the measure (Robert et al., 2006). Here, the lack of demonstrated statistical relevance to the composite RTC score, the poor subscale reliability scores—.53 (95% CI: .46, .59) in Russia and .46 (95% CI: .37, .54) in Ukraine—and the inferences about different frames of reference used to interpret the cognitive rigidity items suggested by the post hoc analysis highlight the need for considerable care in using the cognitive rigidity subscale. This concern is corroborated by Oreg et al.'s (2008) conclusion that the cognitive rigidity subscale was problematic in Slovakia, as well as in Greece and the United Kingdom, neither of which have meaningful historical or cultural links to the former Soviet Union. Therefore, we recommend caution in using the cognitive rigidity items in countries outside the United States, where this subscale has not demonstrated consistently acceptable properties integral to the RTC construct; and we suggest the refinement of the measure with the development of items more indicative of the intended subconstruct before it is used in the post-Soviet region. Such an effort requires delving deeper into the emic aspects of culture that provide the interpretive frameworks for responding to scale items (cf. Schaffer & Riordan, 2003; Vandenberg, 2002) and will require additional validation efforts.

Future studies might examine the traits used by participants in the post hoc interviews to describe cognitively rigid individuals and how these traits may be linked to

a conceptualization of organizational citizenship behavior in this context or to self confidence, as suggested by Oreg et al. (2008). Research might also build on the work of Naus et al. (2008) by exploring a potential connection between role conflict, that is, the concurrent incidence of two or more role expectations (Katz & Kahn, 1978), and the perception of cognitive rigidity as either a form of resistance or compliance, particularly in countries undergoing unprecedented shifts in their institutional and cultural contexts. Finally, revisiting select correlates of RTC might provide insight about cognitive rigidity. For example, Rokeach's (1960) conceptualization of dogmatism, which was formulated in the cold war era with subjects from the Soviet Union, was noted by Oreg et al. (2008) as being similar to cognitive rigidity because both concepts "involve strong personal convictions and a form of stubbornness . . . typically associated with higher levels of self-confidence" (p. 943). In support of this proposition, Oreg et al. cited significant positive correlations between dogmatism and cognitive rigidity, and between dogmatism and overall RTC in Oreg (2003), although the results were not consistent across all of Oreg's samples. Yet if dogmatism and cognitive rigidity are as similar as Oreg et al. (2008) suggest, there are opportunities to explore conceptual overlap between the two, both in the United States and abroad. Additionally, research might examine the merits of treating the three remaining subscales as a single RTC construct, given their high factor intercorrelations, and testing the convergent and divergent validity of the Russian version of the revised RTC Scale with the aforementioned measures that Oreg used for that purpose.

The conclusion of measurement invariance of the rival three-factor specification of RTC across the two samples is tempered by the limitations of the study. The firms were similar in age distribution and mirrored the working populations of the two countries (Federal State Statistics Service of Russia, 2008; State Statistics Committee of Ukraine, 2008), and whereas there were differences in gender distribution and education levels, the two firms are approximately matched on the demographic variables, suggesting comparability between the samples that is important in assessing measurement equivalence (Schaffer & Riordan, 2003). This, combined with Oreg's (2003) findings of no gender, age, or education variation in the RTC Scale structure or mean item scores, suggests no concerns about demographics, although no definitive conclusions are possible because of the aforementioned restrictions on requesting demographic data. Additionally, although participation rates in the study were high, the effects of nonresponse cannot be evaluated. Moreover, some might question the representativeness of the two samples, but we note that six of Oreg's (2003) samples came exclusively from one organization, and organization effects are not likely to be as salient in a measure of individual disposition as they are with firm-level phenomena, as the RTC Scale is not intended to measure a response to a particular change situation.

In conclusion, we believe that the RTC Scale can be a valuable tool in facilitating research that advances extant, mostly Western-centric, theory and enables better practice concerning change-related phenomena in post-Soviet economies and,

potentially, in other countries undergoing transition that is discontinuous and disruptive. Such circumstances simultaneously require change but could also exacerbate resistance to organizational change and development initiatives. Research addressing dispositions, perceptions, and behaviors associated with discontinuous, transformative change is sorely needed, particularly that which examines linkages across the individual, group, and firm levels of analysis. Individual dispositions, including RTC, may condition employee perceptions of workplace change and organizational efforts to induce change, particularly in the post-Soviet context, where employee suspicion of initiatives lingers. Such inquiry holds promise for generating better prescriptive guidelines for successfully coping with transition and the attendant demands for change, including ameliorative human resource management interventions through recruiting, selection, training, and compensation.

Note

1. The final Russian-language version of the scale is available from the authors.

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