

Channel Repertoires: Using Peoplemeter Data in Beijing

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Channel repertoires, the subsets of available channels that viewers actually watch, have typically been measured by relying on respondent recall. Using minute-by-minute peoplemeter data from Beijing, this study operationalized channel repertoire as the channels actually watched for 10 or more consecutive minutes during the week. On average, Chinese viewers used 13 channels, about one third of those available. Older network and local channels accounted for most of the time spent viewing. A regression model was established in which total time spent viewing TV and cable subscription explained 65% of the total variance in repertoire size.

Every year, television viewers around the world have more channels from which to choose. In the United States, for example, the average household receives more than 100 channels of programming—a threefold increase since 1990 (Nielsen Media Research, 2004). In China, the world's largest television audience has seen a fourfold increase in less than a decade (CVSC–Sofres Media [CSM], 2004). We have known for some time that Americans cope with this abundance by winnowing the field to a smaller channel repertoire within which regular viewing occurs (Ferguson, 1992; Ferguson & Perse, 1993; Heeter, 1985; Heeter, D'Alessio, Greenberg, & McVoy, 1983; Neuendorf, Atkin, & Jeffres, 2001). The precision of that information, however, often leaves something to be desired. To date, no study has extended this line of research beyond the U.S. marketplace. This research adds to that literature by (a) investigating channel repertoires using peoplemeter data, thus affording a more finely calibrated look at channel use; and (b) documenting the use of channel repertoires in Beijing, suggesting that this behavior is characteristic of audiences in channel-rich environments worldwide. The authors find that although a large number of channels are

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This research was made possible, in part, by the Communication Studies Graduate Student Fellowship of Northwestern University. The authors thank CSM for making the data available and Mr. Frank Li for helping with the data analysis.

sampled each week, a small number account for the lion's share of viewing. Variation in those repertoires is most easily explained by structural factors (i.e., viewer and channel availability), as specified in the theoretical framework developed by Webster and Phalen (1997).

Channel Repertoires

Heeter et al. (1983) coined the term *channel repertoire* to describe "the set of channels watched regularly by an individual or household" (Heeter, 1985, p. 133). Using household-tuning data collected at a cable headend, Heeter et al. (1983) found that although the cable system offered subscribers 34 channels, the average home watched fewer than 10 a week. These repertoires were conceptualized as a mechanism that viewers used to cope with an increasingly abundant and complex media environment (Heeter, 1985). Early studies (Heeter & Greenberg, 1988) further established that repertoires varied in size (with cable subscribers watching more than nonsubscribers) and composition (with major broadcast networks common to most repertoires, but dissimilar combinations beyond that).

Subsequent research has elaborated on definitions of channel repertoire and sought to further explain variation in repertoire size and composition. Some studies have continued to define repertoires as the total number of all channels watched over a certain period of time—usually a week (Heeter, 1985). Others have drawn a distinction between total channel repertoires (TCRs) and "mindful" channel repertoires—those that come to mind without aided recall (Ferguson & Perse, 1993). Neuendorf et al. (2001) grouped channels into "sets," which were summed to create repertoires, and they attempted to weight channels or sets by the frequency of viewing. Regardless of the definition, the overall pattern is clear: Viewers with abundant choices watch far fewer than the total number of available channels. This is consistent with a recent industry estimate that the average U.S. household watched only 14.8 channels in the course of a week (Nielsen Media Research, 2004).

Researchers have tried to explain variation in the size of repertoires using a range of predictor variables. Webster and Phalen (1997) offered a useful theoretical framework for summarizing these results that draws a distinction between microlevel and macrolevel structural determinants. Some studies favor the microlevel determinants by hypothesizing the individual viewers' media use and demographic characteristics as the primary predictors of the channel repertoires. Heeter (1985) found that the viewers who had an exhaustive channel-search pattern had larger channel repertoires, and that education was a positive predictor of repertoire size. Neuendorf et al. (2001) found that the use of other mass media explained a small portion of the variance of channel repertoire.

A smaller number of studies have considered variation in what Webster and Phalen (1997) identified as structural variables. These include audience availability and the number of choices in the viewing environment. Ferguson and Perse (1993)

operationalized availability as the time spent watching television and the number of choices as a cable–no-cable dichotomy. They concluded that “audience behavior can be explained well without considering individual audience characteristics. The findings show in a powerful way that TCR is a function of audience availability as it interacts with media structure” (p. 42). Table 1 summarizes the principal academic studies of channel repertoires, their operationalizations of the construct, methods, and key findings.

Two limitations in this literature are apparent. First, in the wake of Heeter et al.’s (1983) groundbreaking study, investigators have relied on some form of recall to assess the size and composition of repertoires. In the increasingly complex television viewing environment of the 21st century, which features dozens of channels and near universal penetration of remote control devices, such methods produce suspect results (Webster, Phalen, & Lichty, 2006). Second, the findings are based exclusively on U.S. viewers. It seems likely that viewers in similarly complex media environments would adopt similar coping mechanisms, but that is yet to be demonstrated. This study takes advantage of peoplometer data collected in Beijing to address both shortcomings.

Chinese Television

A few words about the nature of Chinese television and its audience may be useful. Chinese television has undergone significant growth since the 1980s (Chang, Wang, & Chen, 2002). Currently, with some 1.2 billion viewers, it has the world’s largest audience. In some metropolitan areas such as Beijing, audiences have an ever-growing number of channels delivered by cable and satellite systems. Figure 1 shows the dramatic increase in channel availability for Beijing’s audience in the last 8 years.

In Beijing, 95% of the households have at least one TV set with a remote control. The availability of increased programming coupled with low subscription fees has resulted in a combined cable and satellite penetration rate of almost 90%, a level slightly higher than the comparable U.S. national average (Nielsen Media Research, 2004). An average adult viewer spends about 200 minutes a day watching television, or about 80 minutes less than a typical American (Veronis Suhler Stevenson, 2004).

There are three categories of television in the Beijing market. First, China Central Television (CCTV), the only national television service, has 12 channels. About half of those channels are broadcast over the air. These have a longer history and enjoy higher audience shares than the newer cable channels. Except for CCTV-1, which has a breadth of programming comparable to a traditional U.S. broadcast network, each of the other CCTV channels specializes in one or two specific program categories such as news, sports, music, lifestyle, and so on. Second, the local service (i.e., Beijing Television [BTV]) has 9 channels, most of which are distributed via cable. Among these channels, BTV-1 has comprehensive broadcast programming, and the rest of the channels are more or less specialized. Third, there are approximately 50

distant channels from other provinces and cities that are brought to the Beijing audience by cable. Similar to “superstations” in the United States, these distant channels offer a broad range of content.

Today, most Chinese television is advertiser supported, so, much like their U.S. counterparts, Chinese broadcasters need data on the size and composition of audiences at both the national and local levels. Audience viewing data in China are collected by CSM using peplemeter panels. These panels are created through a process of multistage area probability sampling, in which each stage is stratified and sample elements are drawn in proportion to their incidence in the population. Similar to the meters Nielsen Media Research uses to produce national audience ratings in the United States, the CSM peplemeter is an electronic device attached to the TV set that automatically records the minute-by-minute viewing behavior of all the members of the household. Such meters are known to produce a much more precise record of viewing behavior than either diaries or telephone recall techniques and have become the preferred method for measuring television audiences worldwide (Webster et al., 2006).

Hypotheses and Questions

In contrast with previous studies, this study employs detailed minute-by-minute peplemeter data for 1 week. The literature clearly indicates there is no one universally accepted way to define channel repertoires, so it was decided to operationalize the construct in three different ways. Although they are closely related, each has certain virtues and limitations. First, TCR was defined as all the different channels watched during the week. This definition is standard in most earlier research. It is the most generous, or inclusive, of all measures. Second, primary channel repertoire (PCR) was the total number of channels viewed for 10 or more consecutive minutes at least once during the week. This definition most closely approximates that used by Nielsen to compile its channel repertoire data (Nielsen Media Research, 2004). The PCR is necessarily smaller than the TCR. This more conservative measure seemed to be a useful addition because the channel repertoire construct emphasizes the regularity and stability of channel use. PCR disqualifies those channels that appear on the record as a result of channel surfing rather than sustained viewing. Finally, daily channel repertoire (DCR) was defined as the number of channels viewed for 10 or more consecutive minutes on an average day of the week. For example, if a viewer watched TV on the first, second, and then the last day of the week, and the number of channels watched each day was 6, 8, and 10, respectively, then the size of the DCR was 8. Hence, the DCR excludes from the average days when no viewing occurs. DCR, the authors believe, provides a conservative picture of what a typical day is like—at least in terms of channel usage—for a Beijing TV viewer.

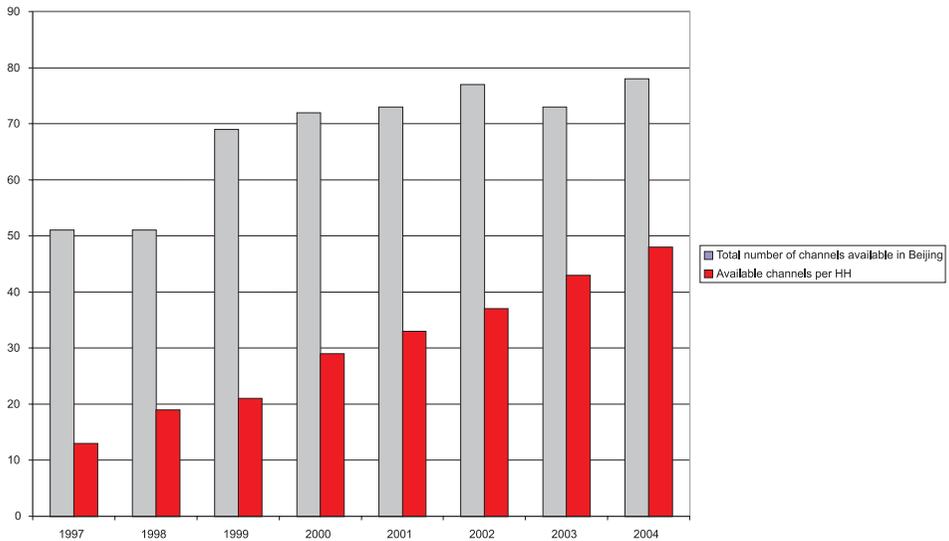
Webster and Phalen (1997) identified two broad perspectives that were most often used to explain audience behavior. The first emphasizes structural factors “that are

Table 1
Summary of Previous Channel Repertoire Studies

Reference	Method	Definition	Significant Predictors
Heeter & Greenberg (1988, chap. 4)	Minute-by-minute household viewing data	Channel repertoire: A set of channels to which a viewer is loyal	N/A (the origin of term "channel repertoire")
Heeter (1985)	Door-to-door survey recall	Channel repertoire: Number of different channels watched one or more days per week Cable channel repertoire: Number of cable channels regularly viewed Viewing concentration index: The collection of the sum of the channel share squared	Education, cable subscription, time spent viewing TV, choice process variables
Lochte & Warren (1989)	Weekly diary	Channel repertoire: The channels watched regularly (at least 5% of the time)	N/A (it confirmed the existence of the channel repertoire)
Ferguson (1992)	Telephone recall	Channel repertoire: The sum of all channels watched by aided recall (broadcast channels) and unaided recall (cable channels)	Channel repertoire: cable subscription, RCD use, RCD motivation variables

Ferguson & Perse (1993)	Telephone recall	Total channel repertoire: The sum of all channels watched by aided recall Mindful channel repertoire: Unaided recall	Total channel repertoire: cable subscription, television exposure, channel changing Mindful channel repertoire: cable subscription, television exposure, intentionality, effort, changing channels motives, affinity
Ferguson & Melkote (1997)	Telephone recall	Broadcast channel repertoire: The sum of broadcast channels and the cable channels that are identical to broadcast channels watched by aided recall Cable channel repertoire: The sum of all cable networks watched by aided recall	Cable channel repertoire: Time spent viewing TV, age and education combined
Neuendorf et al. (2001)	Telephone recall	Repertoire: The total number of channel sets ever viewed Frequency-weighted repertoire: The sum of all 37 frequency of viewing measures, after each is standardized Primary Repertoire: The number of channel sets viewed at least daily Secondary repertoire: The number of channel sets viewed at least weekly Tertiary repertoire: The number of channel sets viewed weekly or less, but at least occasionally	Repertoire: Time spent viewing TV Frequency-weighted repertoire: Time spent viewing TV Primary repertoire: Age, income, time spent viewing TV Secondary repertoire: Time spent viewing TV

Figure 1
Channel Availability in Beijing



Note: From CSM Establishment Survey data.

common to, or characteristic of, the mass. These macro-level factors may be built on individual behaviors, but they reveal themselves only in the aggregate" (p. 24). Those factors include audience availability and the structure of media environment. The second perspective denotes the importance of individual viewer traits in making program choice.

Audience availability is known to have a great influence on television viewing. Program choice is dependent on an individual's availability to view television. The total time that viewers spend viewing TV (TSV) is commonly used to indicate audience availability. Heeter (1985) found television exposure, measured as the total time spent viewing, was among the best predictors of the size of channel repertoires. Ferguson and Melkote (1997) also found a weak positive relation between channel repertoire and total television viewing (i.e., people who spent the most time with TV were likely to have larger channel repertoires). Thus, it is hypothesized that audience availability will be positively related to the channel repertoire among Chinese viewers:

H₁: Viewers who spend more time watching TV will have larger channel repertoires.

Ferguson (1992) and Ferguson and Perse (1993) found that a dichotomous cable subscription variable was the most important predictor of channel repertoire in their

multiple regression models. However, when channel availability is measured as a ratio-level variable that differs from home to home, it is only weakly related to repertoire size (Ferguson, 1992). Nielsen Media Research has also consistently reported that as the number of channels available increases, the number of the channels viewed for at least 10 minutes expands, but at a diminishing rate. That is, when channels are scarce, viewers watch almost all of them. When channels are abundant, repertoires tend to top out at 15 to 20 channels. For instance, households with 7 available channels watch 3 or 4, whereas homes with 180 channels watch an average of 19 (Nielsen Media Research, 2004). Hence, it is hypothesized:

H₂: Cable subscription will increase the size of the channel repertoires.

Meanwhile the individual, or microlevel, factors seem to play a limited, but potentially significant, role. Ferguson and Melkote (1997) found a relatively modest relation between demographic variables and the number of channels in one's repertoire. Neuendorf et al. (2001) posited that seniors and viewers of lower socioeconomic status would spend more time with television, and therefore were likely to maintain larger channel repertoires. They also hypothesized that males would have larger channel repertoires, as they were more likely to have "an instrumental viewing style, with goal-directed reasons for watching, and intentional, concentrated and selective use of television" (p. 466), whereas females, who are more relationship-oriented, would tend toward smaller channel repertoires. Although few studies indicate that there are major effects of demographics such as age, gender, or income on the size of channel repertoires, this study takes the opportunity to retest those hypotheses with the more precise measures of channel usage available in peplemeter data:

H₃: Age is positively related to the size of channel repertoire.

H₄: Males have larger channel repertoires than females.

H₅: Income is negatively related to the size of channel repertoire.

Webster and Wakshlag (1982) noted that viewers tend to watch TV in the company of others, and that group composition affects program choice. However, the findings of the previous research have been inconclusive with regard to the influence of group viewing on the size of channel repertoires. Heeter and Greenberg (1988) speculated that those who view in groups might experience less channel changing than those who view alone because the group tended to constrain individual discretion. However, contrary to expectations, more channel changing was found in the group situation than alone. This suggests that household size might be related to the number of channels an individual sees and led to the following research question:

RQ₁: Will the number of viewers in the household affect the size of channel repertoires?

Method and Data Analyses

This study was a secondary analysis of CSM peoplometer panel data collected during the first week of March 2002 in Beijing, China. The 300-household sample is representative of 2,698,000 television households in the Beijing urban area. The week was chosen because it had no atypical events that might have distorted normal viewing patterns. Individuals 18 years old and over were the units of analysis. Only one individual was randomly selected from each household to be included in the final data analysis. Excluding those who had not watched any TV during the week, the total sample size was 294.

In 2002, the average number of channels receivable per household was 37 (CSM, 2004). Of the 294 viewers sampled, the average size of the TCR was 25.33 ($SD = 12.70$). The average PCR was 13.48 ($SD = 7.22$), and the DCR was 4.52 ($SD = 2.26$). However, such means can be deceptive. Figure 2 is a frequency distribution of DCR.

The distribution has a notable positive skew. This suggests that means, which are the statistic typically reported in the literature on channel repertoires, are inflated by the small number of viewers who have much larger channel repertoires than the rest of the viewers. As a result, median channel repertoire sizes may be a fairer reflection of viewing behavior. In this study, these were TCR = 26, PCR = 13, and DCR = 4.

Further, it should be noted that even among those channels that are viewed, a handful dominate the attention of the audience. In fact the top 10 channels, which were the national network channels and local channels, accounted for 58% of all the time viewers spent watching television (CSM, 2004). Such data are sometimes represented in the form of a Lorenz curve, which is used by audience researchers to illustrate audience concentration (e.g., Neuman, 1991; Webster & Lin, 2002; Yim, 2003). The channels were arranged in ascending order along the horizontal axis and the cumulative percentage of the viewing shares was plotted on the vertical axis. If each channel

Figure 2
Frequency Distribution of DCR

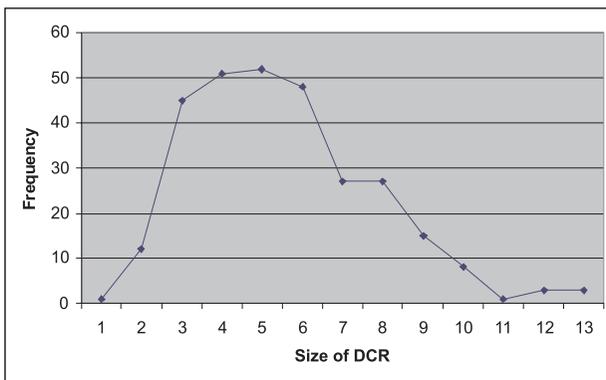
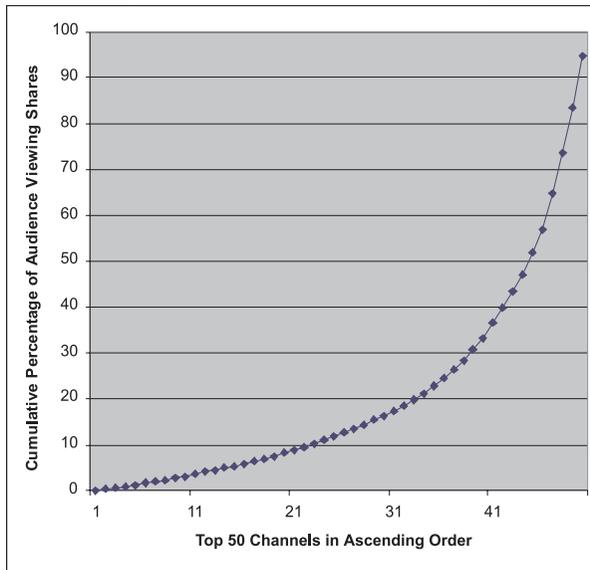


Figure 3
Concentration of Audience Shares



had an equal share then one would expect a straight line (i.e., the equality line, rising at 45 degrees). Concentration is evident in the extent to which the observed curve deflects from the equality line. As can be seen in Figure 3, the majority of the small channels had a modest contribution to the slowly rising curve and the channels with the largest share at the end turned it upward sharply.

As might be expected, the three measures of channel repertoires were correlated. The correlation coefficient between TCR and PCR is .82; TCR and DCR, .63; and PCR and DCR, .84. All correlations were highly significant ($p < .001$). On average, the viewers spent 94% of their TSV watching PCR channels. Therefore, to simplify the reporting of subsequent correlational analyses, the authors settled on PCR as the preferred measure of channel repertoire. (When the same analyses were performed using TCR or DCR as the dependent variable, the results were substantially the same.)

Table 2 is a correlation matrix that depicts the relations among all macro- and microlevel variables and PCR. TSV, an index of audience availability, was highly correlated with PCR ($r = .74, p < .01$). It thus confirmed the findings of the previous studies that TSV is positively correlated with channel repertoire, fully supporting Hypothesis 1. It is also worth noting that light viewers not only had smaller PCRs but also watched these channels less frequently than heavy viewers. The frequency of watching PCR channels was highly correlated with the time spent watching the PCR channels ($r = .63, p < .01$). Cable subscription was also highly correlated with PCR ($r = .37, p < .01$). Thus, Hypothesis 2 is supported.

Table 2
Correlations Matrix Between the Structural and Individual Factors
and Primary Channel Repertoire

	Time Spent Viewing	Cable	No. of Viewers	Gender	Age	Household Income
Primary channel repertoire	.74**	.37**	-.03	-.05	.19**	.04
Time spent viewing		.05	-.04	-.01	.28**	-.03
Cable			-.05	.01	.10*	.28**
No. of viewers				.02	-.14*	-.01
Gender					.04	-.00
Age						-.02

Note: $N = 294$.

* $p < .05$, two-tailed. ** $p < .01$, two-tailed.

Even though the authors employed a much more sensitive measure of channel usage than most previous research, no significant relations between PCR and gender, income, or number of viewers in the home were found. There was a weak positive relation between age and PCR ($r = .19, p < .01$) but that was likely an artifact of the relation between age and TSV ($r = .28, p < .01$). Therefore Hypotheses 3, 4, and 5 were unsupported.

To offer a parsimonious explanation of variation in channel repertoires, a hierarchical forced entry regression was performed; the results are shown in Table 3. As would be expected from the results of the correlation matrix, TSV enters the equation first, followed by cable subscription, coded as a dummy variable. Those two factors explained 65% of the variance in repertoires. No other factors (i.e., individual audience factors of gender, age, and household income) added significantly to the predictive power of the equation.

Table 3
Regression Model of Primary Channel Repertoire

	β
Block 1: Structural variables	$R^2 = .65, F = 212.96, p < .001$
Time spent viewing	.72**
Cable subscription	.35**
Block 2: Individual variables	$\Delta R^2 = .00, \Delta F = 1.18, p = .32$
Gender (male = 1, female = 2)	-.05
Age	-.04
Household income	-.04
No. of viewers	.04

Note: The regressions are all hierarchical forced entry.

** $p < .01$, two-tailed.

Conclusion

Our study confirmed the existence of the channel repertoires among Beijing television viewers. In a typical household with 37 channels, an average viewer would normally encounter about 25 different channels (TCR) during a week, 13 of which would be watched for at least 10 consecutive minutes (PCR). However, these means tend to overstate repertoires, because they are distorted by the few viewers who had large repertoires. In fact, of the 294 viewers, about 55% watched 4 channels or fewer on a daily basis (DCR).

The total number of channels watched (TCR) had a wide range of values at the individual level. By that measure, some people watched as many as 51 channels during the week. A more conservative measure, and the preferred operationalization of the construct, was PCR. With its 10-minute threshold, it was most consistent with industry-based definitions. Although it was highly correlated with the other two measures, it filtered out much of the "noise" (e.g., fast-paced channel surfing) captured by peplemeters.

TSV and cable subscription explained about 65% of the variance in PCRs. This relatively simple model explained more variance in channel repertoires than any other reported in the literature thus far. The overall pattern, though, is consistent with earlier studies that found macrolevel structural factors to be the most important predictors of channel repertoire size (Ferguson, 1992; Ferguson & Perse, 1993). Conversely, even though the authors employed a more sensitive measure of channel use than previous research, repertoires could not be explained by the viewer's age, gender, income, or the number of viewers within the household. Despite whatever theoretical appeal they may have, these microlevel factors are of very little value in predicting channel repertoires.

Although this study does a good job of describing the size of channel repertoires and establishing the generalizability of this phenomenon outside the United States, much related research remains to be done. For instance, relatively little is known about the composition of the channel repertoires. Future studies should consider how different kinds of people construct not only repertoires of different sizes, but different substance. Moreover, the increased availability of technologies like digital video recorders and video on demand may cause one to rethink the entire concept of repertoires altogether.

For now, the results clearly suggest that Chinese viewers deal with an abundance of viewing options much like U.S. viewers and, presumably, viewers in the rest of the world. Greatly increasing the number of available channels results in moderately larger repertoires. The typical Beijing viewer watches only about one third of the available channels in any meaningful way in the course of a week. Further, whereas many channels are briefly sampled, the older more established channels continue to dominate TSV. In Beijing, the dominant channels are the national broadcast networks and local channels. Distant channels, now available on cable, captured only a tiny share of viewing and were often ignored altogether. It appears that the dramatic

expansion in the number of channels available to the Chinese audience has, thus far, produced only modest changes in the program choices of the typical viewer.

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