New opportunities for aircraft noise policy in the Netherlands

Maarten Kroesen 1

Delft University of Technology, 2600 GA Delft, The Netherlands

This paper aims (1) to provide a review of the (non-acoustic) social-psychological determinants of aircraft noise annoyance, (2) evaluate Schiphol's noise policy from a social-psychological perspective and (3) review a governance model that can effectively address non-acoustic factors in aircraft noise policy. It is concluded that the insights in the psychology of noise annoyance inform us that local actors in the relationship ‘airport-environment’ should have the means to adjust to each other's presence. However, presently aggregated claims (e.g. average energy-equivalent noise norms), which are ineffective in representing and regulating the social conflict between the airport and its environment, have become dominant in aircraft noise policy. Resultants of this policy are polarization, deficient local control, distrust and noise annoyance. The paper concludes with a review of a previously developed governance model, in which local actors are given room to formulate specific individual preferences and establish transactions between them. This model aims to enhance local control and provide a context of mutual trust in the relationship ‘airport-environment’. Within this context aircraft noise may not necessarily be reduced, but can become much less annoying.

I. Introduction

CURRENT Schiphol policy focuses on a sustainable balance between space for developing Schiphol as an airport and the safety, quality of life and spatial-development potential around the airport. The aforementioned studies found that this policy generally worked well. [emphasis added] (Government White Paper, 2006, p. 5)

At the time, this was the main conclusion of the Dutch Cabinet in relation to the Schiphol policy, based on the results of an extensive three-year evaluation program to assess its effectiveness. It was published in April 2006, at the same time I got involved into aircraft noise around Schiphol airport, initially as a Master and later as a Ph.D. student. Going through the studies that supported this conclusion, I indeed found compelling evidence. For example, at Amsterdam Schiphol only 10,000 people are exposed to annual equivalent noise levels of 55 dB(A) or more. In comparison, at London Heathrow, an airport of equal size, this number is 70,000. Moreover, extensive insulation programs have been carried out for dwellings in the vicinity of Schiphol airport. In fact, few airports in the world have spent so much money (~600 million) on insulation measures. In terms of the quality of life of residents living in the vicinity of Schiphol airport the policy indeed seemed successful.

However, in my search for the underlying evidence, results contrary to this conclusion also surfaced. For example, at Schiphol, there were also 10,000 people who complained, while, at London Heathrow, this number was little over 2,000. In addition, much more people at Schiphol were annoyed by noise than was to be expected on the basis of the ‘EU-curve’ between noise and annoyance (RIVM and RIGO, 2006; European Communities, 2002). Lastly, distrust was observed to be widely spread among political actors (Derksen et al., 2006) as well as among the general public living in the vicinity of the airport (Interview NSS, 2006).

In sum, objective (decibel levels) and subjective (complainants, annoyance, distrust) indicators showed a remarkably different picture. But, how could this discrepancy be explained? Was the noise policy doing something wrong after all? And, if so, how should it be changed? For the last three years I have been occupied with these questions. It soon became apparent that the discrepancy could be explained by the existence of so-called non-acoustic factors. These are factors, other that acoustic variables (e.g. noise level, the number of events and the time of day of events), that influence people’s reaction to the noise. Previous research has revealed that these factors mainly compromised social-psychological variables, like attitudes towards the noise source authorities (e.g. trust), beliefs about the economic and environmental effects of the airport, and feelings of control. In my own research I have tried to add to this body of knowledge.
With this background the aims of this paper are threefold: (1) to provide an overview the literature on noise annoyance research and non-acoustical factors, (2) to provide, from a social-psychological perspective, an explanation for the ineffectiveness of Schiphol’s noise policy, and (3) to review a previously developed governance model that aims to address non-acoustic factors in noise policy. Within this structure I will present the results of three projects that were carried out in the framework of my Ph.D. thesis. The paper concludes with a discussion of a final research project: a simulation experiment to test the new governance model.

II. An overview of noise annoyance research

A. The exposure-effect relationship

The dominant branch in noise annoyance research has focused on the most obvious determinant of noise annoyance: the physical level of noise exposure. The effects of this variable are generally presented as dose-response relationships, e.g. the percentage of highly annoyed people, at a given level of noise exposure, calculated or measured with energy-based noise metrics like Lden. Schultz (1978), who was the first to integrate the results of 11 community surveys, developed a general dose-response relationship for transportation noise, which was updated by Fidell et al. (1991) and Miedema and Vos (1998). Although the physical level of noise exposure could predict community response, it could not account for all the individual variability in noise annoyance. Based on a review of 39 surveys Job (1988) concluded that only 9%-29% of the variation in noise annoyance could be explained by noise exposure.

B. Explaining individual variability

At Schiphol, the large discrepancy between objective and subjective indicators shows that noise exposure and noise annoyance are not one and the same. Stallen (2001) previously illustrated this point nicely with the analogy of a piano-playing neighbor: “The sounds of his piano may not be particularly disturbing, but if this neighbor also (disrespectfully) parks his car on your parking lot, even his pianissimo becomes very annoying.” The same principle, Stallen (2001) argues, holds for collective exposure to noise, in the relationship between the airport and its environment. Similar to exposure to noise, residents around an airport are exposed to a social context (‘you expose me’, Stallen, 2001). Hence, anecdotal evidence suggests that if residents distrust the noise source authorities, they will be more annoyed by the noise.

A research branch, parallel to the acoustical one, occupied itself with trying to statistically explain the remaining variation in noise annoyance, while controlling for acoustic influences. Within this field the effects of personal and situational variables on individual levels of noise annoyance are studied via survey research or experiments. This branch identified a range of so-called non-acoustical factors, which are relevant in the prediction of noise annoyance.

Borsky (1961), McKennell (1963) and Leonard and Borsky (1973) showed that noise annoyance was associated with source evaluation, misfeasance in relation to the authorities, fear of an aircraft crash and concern about health effects. Job (1988) found that the attitude to the noise source and sensitivity to the noise were strongly related to noise reaction. These factors could even account for more variance in annoyance than noise exposure could. A meta-analysis of Fields (1993), based on 136 surveys, revealed that socio-economic and demographic variables (age, sex, social status, income, education, home ownership, dwelling type, length of residence and personal benefit) had little influence on the level of noise annoyance. Instead, annoyance was related to fear of danger from the noise source, noise prevention beliefs, general noise sensitivity, beliefs about the importance of the noise source and annoyance with non-noise impacts of the noise source. Similar results were obtained by Miedema and Vos (1999). Overviews of relevant non-acoustical factors are given by Lercher (1996) and Guski (1999).

C. Testing a theoretical model

Although studies have been successful in discovering a broad set of relevant variables, they can be characterized as highly inductive, which generally means that they lack a sound theoretical basis (Taylor, 1984). The result is that insights in the underlying mechanisms that cause noise annoyance remain absent. For example, what is the underlying causal mechanism in the relationship between distrust and noise annoyance?

In order to fill this gap, Stallen (1999) developed a theoretical framework to explain the process of noise annoyance by applying the psychological stress theory of Lazarus (1966). Empirical research by Lazarus (1966) and others had revealed two major determinants of stress: perceived threat and perceived control. Stallen (1999) argued that perceived disturbance (i.e. short-term or immediate annoyance) and perceived threat basically form equal concepts. Subsequently, noise annoyance as a form of psychological stress is determined by the extent to which a person perceives a threat (i.e. perceived disturbance) and the possibilities or resources that a person has with which to face this threat (i.e. perceived control) (Stallen, 1999). A simplified and slightly adapted version of Stallen’s model is presented in Figure 1.
The level of perceived disturbance, also called the primary appraisal, is a person's evaluation of the impact of the threat or harm in relation to his or her well-being. The acoustic situation to which one is exposed is considered the main determinant of this evaluation. After a threat or harm is recognized a process of secondary appraisal is triggered. Within this process the resources to face the threat are evaluated. One potential resource results from the relationship one has with the noise source. If this relationship is good, one is better able to handle the impact of the stressor. However, in the words of Maris et al. (Maris et al., 2007a, p. 2001): “if the exposed has little control over the source, or little trust in the source, the perceived coping resources will be reduced and psychological stress will arise.” Next to the noise management by the source, other non-noise related attitudes can be considered as potential coping resources. In this respect Stallen (1999) mentions non-acoustical factors like beliefs about the importance of the noise source and annoyance with non-noise impacts of the noise source, which were investigated by Fields (1993).

Based on his model, Stallen (1999) argues that if the perceived threat (i.e. noise) is larger than the perceived resources to face the threat (i.e. perceived control and coping capacity), psychological stress (i.e. noise annoyance) will arise. In addition, even though the perceived disturbance may be very high, no noise annoyance will arise if there are sufficient coping resources. Lastly, since the process of coping is in a constant flux the theoretical framework includes multiple reciprocal relationships between variables.

The model of Stallen did provide the theoretical mechanisms which supported the relationships between non-acoustic factors and noise annoyance. However, the model was not yet empirically validated. The first project of my Ph.D. research was focused on providing this validation. Together with Molin and Van Wee I further developed the conceptual model of Stallen and tested it via a statistical model (Kroesen et al., 2008). Data from residents living in the vicinity of Amsterdam Airport Schiphol in the Netherlands (n=650) were used to estimate a structural equation model. The specified model could adequately reproduce the observed correlational structure in the data, providing empirical support for the theoretical model of Stallen on which it was based. The final model could explain a large portion (78%) of the variance in noise annoyance (Kroesen et al., 2008).

D. The issue of causality

The evidence mentioned in the previous sections related to the influence of non-acoustic factors on noise annoyance, is based on the assumption that these factors cause noise annoyance and not the other way around. The direction of causality can be supported by theory, but, since the evidence is based on cross-sectional survey studies, it cannot be empirically investigated. Temporal order is generally treated as one of four criteria necessary to establish a causal relationship. However, since the independent and dependent variables are measured at the same moment in time, the criterion of time-precedence (i.e. cause X proceeds effect Y in time) cannot be verified. The issue of temporal order can only theoretically be addressed. For structural variables like age, the direction of causation is evident. However, if the relation between a certain social-psychological construct and noise annoyance is examined, which are both subjective in nature, it becomes difficult to theoretically distinguish cause and effect.
The criterion of time precedence, however, can be controlled under experimental conditions. Experiments allow the researcher to control which subjects are exposed to which treatment. For example, Glaser and Singer (1972) have shown via several experiments that an individual’s level of perceived control over the degree of noise exposure influences a person’s noise reaction. In similar fashion Maris et al. (2007a; 2007b) have shown that the fairness of the procedures preceding the actual exposure to noise influences the degree of noise annoyance. These studies can firmly establish causality for the sample under investigation.

E. Noise annoyance as the expression of collective political claims

Another way to deal with the criterion of temporal order, and with the notion of causality in general, is to circumvent the issue altogether. I took this direction in my second research project together with Christian Bröer. Based on previous research of Bröer (2006; 2007), we hypothesized that people, when confronted with aircraft noise in their residential environment, develop holistic frames to give meaning it. We defined a frame as an interrelated and coherent set of beliefs and attitudes that people use to observe and give meaning to reality (Goffman, 1974; Rein and Schön, 1993; Schön and Rein, 1994; Weick, 1995). Our second and related hypothesis was that people ‘borrowed’ their frames from the noise policy discourse, defined as the way public actors shape and give meaning to the problem of aircraft noise (Hajer, 1995). We assumed that the policy discourse (and subsequently the internal frames) contained “feeling rules” (Hochschild, 1979), legitimizing or de-legitimizing concerns, complaints or fears. In sum, we expected that the way policy actors would publicly shape and give meaning to the problem of aircraft noise would resonate among residents and provide them with the necessary frames of reference to attribute meaning to aircraft noise (e.g. noise annoyance) (Kroesen and Bröer, 2009).

![Figure 2. Discourse model of noise annoyance. Note: The discourse approach assumes that meaning is provided to aircraft noise through an individual frame which is schematized here as a filter. Secondly, it assumes that the individual frames are congruent with the policy discourse (source: Kroesen and Bröer, 2009).](image)

Instead of assuming a Newtonian cause-and-effect model, like the model in Figure 1, we assumed that aircraft noise annoyance is a position taken in a coherent constellation of other (non-noise-related) attitudes, which are shaped by a public discourse (see Figure 2). This model does not rely on a causal mechanism (and the related assumption of time-precedence) between two variables, for example to support the relationship between distrust and noise annoyance. Instead, the frames form the causal mechanism behind the observed patterns of attitude positions. It is within the context of whole frames, i.e. the sets of interrelated positions, that individual positions (like annoyance) receive their meaning. The question over which came first (e.g. annoyance or distrust) therefore becomes irrelevant.

Using Q-methodology, a method suitable to reveal subjective structures (Brown, 1980), among a sample of residents living near Schiphol, we found five frames, three of which were strongly linked to the Schiphol’s policy discourse. To illustrate to congruence between the policy discourse and the individual frames we first characterize the discourse. The qualification of Schiphol’s policy discourse will also be used in Section III to assess the policy’s effectiveness in terms of non-acoustic factors.

F. Schiphol’s policy discourse

Ever since aircraft noise was identified as a problem in the 1950s it has been treated as a (mere) technical problem. The fundament of the noise policy was to fit the airport, with its noise footprint, in the residential environment surrounding the airport, such that the flight routes avoided living areas. Aggregated models, like the exposure-response relationship (Section 2A), played a significant role in this perspective. They could be used by central authorities to define limits to aircraft noise to protect the public. Under this model residents were assumed to be passive receivers of noise and uniform in their response to it. As apparent from the introduction the central planning perspective in the Netherlands has been successful in fitting Schiphol’s noise footprint in such a way that it avoids densely populated residential areas (at least compared to other European airports). Evidently, however, the problem of aircraft noise could never entirely be solved. To some extent, residential areas were still affected by aircraft noise. Eventually, the planning perspective, with its underlying unsolvable
conflict (i.e. “noise is an avoidable problem” versus “some noise needs to be accepted”) led to a policy deadlock.

To escape it a new (international) story-line was introduced in the 1990’s, called “ecological modernization” (Weale, 1992, Mol and Spaargaren, 1993, Hajer, 1995). The combination of this story-line with the existing discourse has led to the policy discourse that exists to the present day, which Bröer (2006) termed the “mainport and environmental discourse”. The basic assumption of this new story-line was that economy and environment could be developed at the same time; the attainment of both economical and ecological goals should be regarded as a positive-sum game. The promise of ecological modernization relied strongly on developments in science and technology and market-based policy instruments (e.g. environmental taxes). Related to Amsterdam Schiphol the economic benefits of aviation became known under the umbrella term “mainport”, which was considered a vital entity for the Netherlands in the context of a globalizing economy. Schiphol should be seen as an “engine of the economy”. The ecological negative externalities, most notably noise, but also risk and pollution, became known under the umbrella term “environment”. From 1990’s the mainport and environment discourse was spread among citizens through extended participatory processes. Repeatedly, citizens were called upon to be alert, to be informed and to express their interests. In 1995, the mainport and environment discourse was institutionalized, when the decision was made to construct Schiphol’s fifth runway (mainport) and to implement noise contours (environment).

Although the principle of ecological modernization seemed to have provided a viable new perspective, it could actually be seen as an explicit reformulation of the existing problem conceptualization (i.e. the planning discourse) in modern (neo-liberal) terms. Policy makers seek to accommodate growth of the airport while trying to avoid its negative effects on the environment via traditional planning instruments. In the end, we can conclude that aggregated collective claims never lost their appeal. The only difference is that nowadays, in addition to the exposure-response relationship, the terms ‘mainport’ and ‘environment’ are used as explicit representations of these collective claims.

G. Residents’ frames of aircraft noise

To assess the congruence between the policy discourse and individual frames, we needed a method to reveal these frames. The Q-method seemed suitable for this task (Brown, 1980; McKeown and Thomas, 1988). Using this method, we let participants from one neighborhood in Amsterdam (to keep the noise exposure level constant) rank-order a sample of statements (n=48), representative for the whole of subjective communicability about aircraft noise expressed by residents living in the vicinity of Schiphol. By factor analyzing these rank-orderings we could identify consistent patterns (i.e. frames). Five factors were extracted. Their patterns for 11 of the 48 statements are presented in Table 1 (Kroesen and Bröer, 2009).

Residents in the first three frames (A, B and C) strongly express themselves in terms of the aggregated political claims of mainport and environment. Frame A, ‘Long live aviation’, emphasizes economic benefits and is indifferent about the environmental costs of aviation. They agree with the statement that aircraft noise belongs to this day and age. Residents in this frame are not annoyed by noise. Frame B, ‘Aviation: an ecological threat’, shows the opposite picture and emphasizes that aircraft noise is an important (environmental) problem. Residents feel as if aircraft noise is forced upon them and they are distrustful towards the noise source authorities. Yet, they also agree with the statement that aviation is important for employment. In all, a moderate annoyance response is legitimized. Frame C, ‘Aviation and the environment: a solvable problem’, again emphasizes the economic benefits, but also to a lesser extent the environmental costs. Residents in this frame resolve this tension by advocating the relocation of the airport to the sea. They are not particularly annoyed by noise. Frames D and E do not express themselves in the aggregated claims of mainport and environment. Frame D, ‘Noise is not a problem’, is, in contrast to all other frames, not regularly disturbed by noise. A plausible inference is that because aircraft noise is not perceived as a threat (primary appraisal), the process of evaluating the resources to cope with this threat (secondary appraisal) has never been triggered. Residents in this frame are also not annoyed by aircraft noise. Frame E, ‘Aviation: a local problem’, is also indifferent about economic and environmental claims. In this frame, aviation is regarded as a local problem, which can be solved by an individual solution; moving to a quieter neighborhood. Again, a moderate annoyance response is legitimized.
Table 1. Five frames on aircraft noise

<table>
<thead>
<tr>
<th>Theme</th>
<th>Statement</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economy</td>
<td>Schiphol is an engine of the economy.</td>
<td>5</td>
<td>0</td>
<td>5</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Aviation is important for the employment.</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Environment</td>
<td>Aviation is a threat to the environment.</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>-3</td>
<td>-1</td>
</tr>
<tr>
<td></td>
<td>Noise annoyance from aircrafts is an important problem.</td>
<td>0</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Modernity</td>
<td>The sound of aircrafts belongs to this day and age.</td>
<td>3</td>
<td>-2</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Control</td>
<td>I have the feeling that aircraft noise is forced upon me.</td>
<td>-2</td>
<td>4</td>
<td>-3</td>
<td>-3</td>
<td>-4</td>
</tr>
<tr>
<td>Attitude source</td>
<td>I believe that Schiphol always gets his way.</td>
<td>-3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Attitude relocation</td>
<td>Schiphol should be relocated to the sea.</td>
<td>-5</td>
<td>0</td>
<td>4</td>
<td>-2</td>
<td>-2</td>
</tr>
<tr>
<td>Noise perception</td>
<td>I regularly hear aircrafts.</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>-2</td>
<td>5</td>
</tr>
<tr>
<td>Attitude moving</td>
<td>If I could I would move to a quiet neighborhood.</td>
<td>-4</td>
<td>-1</td>
<td>-4</td>
<td>-1</td>
<td>4</td>
</tr>
<tr>
<td>Noise annoyance</td>
<td>I am annoyed by aircraft noise.</td>
<td>-5</td>
<td>2</td>
<td>-1</td>
<td>-4</td>
<td>2</td>
</tr>
</tbody>
</table>

Range: [-5=strongly disagree, 5=strongly agree]
Frames:
A: Long live aviation! (the economic stance)
B: Aviation: an ecological threat (the environmental stance)
C: Aviation and the environment: a solvable problem (the technocratic stance)
D: Noise is not a problem (the anti-government stance)
E: Aviation: a local problem (the a-political stance)

Since most of the participants in our sample (86%) loaded on one of the first three factors (A, B and C), we concluded that the policy discourse is a source of arguments which plays a dominant role in structuring the frames of people (Kroesen and Bröer, 2009). Policy making could be viewed as a possible mechanism through which the sound of aircrafts is turned into annoyance. The policy provides residents with the necessary social context to legitimize an annoyance response (Kroesen and Bröer, 2009).

H. Conclusion
The foregoing sections describe an eclectic collection of insights in the non-acoustic determinants of aircraft noise annoyance. We can conclude that the relevance of non-acoustic factors has been demonstrated in large body of empirical research, which relies on different theoretical models (psychological stress theory, discourse model) and in which different research methodologies have been applied. Within this body of knowledge the factors ‘perceived control’ and ‘social context’ stand out. The influences of these two factors have been established in experimental settings as well as field studies.

The Q-analysis showed that for residents living near Schiphol the social context is effectively shaped by collective political claims. Within this social context control resides with the central government and not with local actors in the field. This context provides a fertile breeding ground for feelings of powerlessness and distrust in the noise source authorities (i.e. the central government and Schiphol).

Using the present insights in the non-acoustic determinants of aircraft noise annoyance, the next section will provide a social-psychological perspective on noise policy at Schiphol.

III. From theory to practice: a diagnosis of Schiphol’s noise policy
At Schiphol, the conceptualization of aircraft noise as a technical (acoustical) problem, which is to be addressed by central authorities, has prevailed. The central planning perspective has been successful in fitting Schiphol’s noise footprint in such a way that it avoids densely populated residential areas. Hence, to a certain extent the conceptualization of ‘noise equals annoyance’ is legitimate. In the end, aircraft noise can be quantified in terms of decibels, and such quantities are necessary to support collective norms. For example, at Schiphol the norm is that a maximum of 10,000 households may be exposed to a noise level of 58 dB(A) Lden or more. In principle, there is nothing wrong with such an collective norm. It clarifies to which extent noise producers are legitimized to make noise (or not) and noise receivers are forced to accept noise (or stand in their right to oppose it). However, the problem arises when such aggregated norms start to overrule individual claims, preferences and policies.

Recall Stallen’s (2001) example of the piano-playing neighbor (Section 2.2). Imagine that a third neighbor (who lives across the street) tries to mediate the conflict between the other two. He chooses an energy-equivalent noise measure to calculate the total amount of noise the piano-playing neighbor produces on average in a year. He then defines a point on this scale up to which the piano-playing neighbor is legitimized to produce noise and the other neighbor is forced to accept it. The third neighbor believes this point is a social optimum which maximizes the first neighbor’s utility for quietness and the second neighbor’s utility for playing the piano. He develops a difficult calculation model, which neither of the other two neighbors truly understands, to support the enforcement of this norm.
It is readily apparent this approach is a strange way to mediate the conflict between the two neighbors. The technical approach obscures the true nature of the problem, which is, in fact, a social conflict. Instead of bringing the two neighbors together on speaking terms, the technical model further drives them apart; under the conditions of the technical model there is no need for them to talk to each other. All they can do to influence each other’s behavior is by asking the third neighbor to apply respectively more or less stringent acoustical norms. In addition, the technical approach claims to adequately represent the (sum of the) individual preferences. This claim is false since the car (recall that the piano-playing parked his car on annoyed neighbor’s parking lot), which can be regarded as the second driving force behind the conflict, is entirely left out as a relevant issue to be discussed. Second, on a more subtle level, is the false claim of the annual average noise metric to adequately capture the annoyed neighbor’s disturbance. For example, the annoyed neighbor might only be annoyed by particularly low sounds or during particular time-frames during the day. An average energy-equivalent metric is insensitive to such preferences. Furthermore, the technical approach provides no room for discussion and possible transactions that might benefit both parties. The two neighbors are prevented to reach a ‘win-win’ situation. Instead, they become very distrustful towards one another, because they both suspect each other to manipulate the third neighbor to revise the norms for their own benefit.

The foregoing is a hypothetical example, but this process can actually be observed in the context of Schiphol airport. In this case the central government can be regarded as the third neighbor, which tries to mediate the (social) conflict between Schiphol airport (and other actors in the aviation industry) and its environment (local governments and citizens). In this process, aggregated models (e.g. the exposure-response relationship) and collective claims like ‘mainport’ and ‘environment’ have become dominant. The central government, i.e. the Ministry of Transport, is the main actor giving shape to this conceptualization. Like the example of the two neighbors aggregated claims are necessary. In the case of Schiphol, they can be used to support the political decision to let the airport grow or to decide against further growth. While such a national decision is indeed necessary, it leaves the social component of noise annoyance (you expose me) unaddressed. To address this side the two neighbors must be given opportunities to adjust to each other’s presence. However, in the case of Schiphol, collective claims have become so dominant that there is no room for the expression of individual, local or situational-specific preferences, let alone that these preferences can be exchanged against one another. For example, the system, used by the central government, to control aircraft noise, prevents that a relocation of a flight path can be exchanged against increased use of the flight path. The relocation and the increased use can be reasonable individual preferences of a particular municipality and the airport respectively. The system to control noise leaves no room for such exchanges, thereby maintaining the social conflict between the airport and its environment.

In a third research project, I, together with Menno Huys and Pieter Jan Stallen (Kroesen et al., 2009), assessed the noise-policy preferences of actors involved in Schiphol policy. The Q-method was again used to reveal actors’ perspectives on this subject. In line with the results from the study among residents, we showed that policy actors also expressed themselves in terms of aggregated claims like mainport, environment and noise norms. Local and individual strategies to reduce noise were evaluated negatively. Given that actors only have the means to express themselves in terms of aggregated claims the outcome is always a point on a predefined one-dimensional scale (mainport vs. environment, growth vs. no growth, more vs. less noise), resulting in a win-lose situation. There are no transactions possible between the aggregated claims, only a trade-off is possible. Since the ‘game’ is perceived as such, actors are encouraged to take extreme positions. The result is strong controversy and polarization (Van Eeten, 1999; Teisman et al., 2008; Kroesen et al., 2009).

At this point, we can provide an explanation for the discrepancy between objective and subjective indicators raised in the introduction. Because of the dominance of aggregated claims policy actors/residents have never learned to express themselves in terms of local or individual preferences. In order to be heard and understood by the central government local actors have to use the dominant language, compromising terms like mainport, environment and noise norms. These collective entities are ineffective in representing the social conflict between the airport and its environment. As a result, local actors have no control over this conflict. In terms of the psychological stress theory, they have no personal resources to cope with the stressors (the exposure to noise and to the social conflict). The fact that the technical-administrative approach denies the existence of this conflict drives the two neighbors, the airport and its environment, further apart. Both also suspect (and sometimes indeed accuse) the other party to manipulate the central government to ‘mess around’ with the noise norms. The insights in the social-psychological determinants of noise annoyance inform us that, within the resulting situation of deficient local control and distrust (Derksen et al., 2006; Interview NSS, 2006), aircraft noise easily becomes very annoying.
IV. An innovative governance model

If our diagnosis is correct, the solution to the problem described in the previous section is simple: local actors must be given more opportunities to effectively deal with each other and adjust to each other’s presence. Let’s first go back to the example of the two neighbors. In addition to applying some kind of acoustical criterion, the third neighbor might also invite the two neighbors at his dinner table. He would then ask the two neighbors to make a list of their specific grievances and/or desires. In comparing the two lists, the two neighbors might come up with transactions between their specific ‘wants’. For example, the annoyed neighbor might be willing to accept that the piano-playing neighbors plays between seven and eight o’clock, if the piano-playing neighbors agrees that he will only play pieces without any low tonal components. In addition, the transactions might also cover non-noise related issues, e.g. related to the car. Whenever a transaction is established, the two neighbors can hold each other accountable for living up to their respective promises. Hence, instead of manipulating the third neighbor to get things done, they directly ‘control’ each others behavior. The underlying idea is that the created interdependencies provide a firm basis for mutual trust.

To accomplish this in the policy practice at Schiphol Stallen et al. (2004) previously developed an innovative governance model. They argue that the central government should reconsider which collective political decisions are to be made on a central level and which goals and policies can be developed regionally, i.e. by local governments, citizens groups and the aviation sector. When certain decisions and policies can be allocated to regional actors, room becomes available for them to articulate their interests in multiform ways (instead of two opposing interests growth/no growth). Subsequently, a process of giving-and-taking between the formulated objectives via a multitude of mutual transactions can take place. These transactions can be made on all kinds of issues, which, in the present situation, are unjustly ‘fixed’ by central regulations, e.g. land-use policies, the determination of flight paths, the peak hour capacity of the airport, noise insulation policies, the night-time regime of the airport, house moving schemes, policies that enhance the overall environmental quality in the region of Schiphol, policies for complaint registration and handling, information provision (also for those who are moving into the affected area), etc. Within this model regional governments and the aviation sector can hold each other accountable. To facilitate these transactions Stallen et al. (2004) advocate the creation of a regional institution with an administrative mandate. They use the term regional transaction model to define this new governance model. By letting Schiphol and its environment adjust to each other’s presence, a social context that enhances trust can be created. Within this social context aircraft noise may not necessarily be reduced, but can become much less annoying.

A major barrier in the transition towards the new governance model is that local actors must learn to formulate their own ‘wants’, instead of using the collective ‘wants’ of the central government. Local actors have little experience with this. Moreover, since they presently formulate their goals and interests in terms of the collective claims, we would not expect them to be easily convinced of a governance model that requires them to reconsider these. The next section will outline a final (on-going) project that aims to overcome this barrier.

V. Future outlook: a gaming-simulation of conflicting claims

In the final project of my Ph.D. thesis I, in cooperation with Pieter Jan Stallen Sebastiaan de Stigter and Elaheh Soltani, will try to assess the validity of the underlying line of thought expressed in the previous sections (Stallen et al., 2009). Specifically, we wish to assess the validity of the following hypothesis:

A governance model in which local actors in the relation ‘airport-environment’ can only passively formulate their preferences (in terms of aggregated claims), will be ineffective in terms of technical (creativity, innovation, spatial efficiency), administrative (polarization, stagnation) and subjective (frustration, noise annoyance) indicators. On the other, a governance model, in which local actors can actively formulate their situational-specific preferences, will be effective in terms of technical, administrative and subjective indicators.

For a valid test of this hypothesis, the social interactions between policy actors need to be modeled. After all, we are interested in the question whether the new governance model indeed leads to the desired transactions between local actors. However, to answer the question ‘which transactions are possible?’ it is also necessary to model the physical (technical) system of the airport and its environment. Actors need to be able to interact with this system; they need to be able to consult it, provide input to it, and receive feedback from it. The technical system shapes the margins of the process and is an important reality check for the substantive discussions and negotiations.

A gaming-simulation is method that can model both the social-political and the technical complexity of a system, and is therefore suitable method to investigate the formulated hypothesis (Mayer, 2009). Within a gaming-simulation roles can be assigned to participants to shape the related interests, problem perceptions and resources. However, in contrast to agent-based models, in which the actors have a limited number of preferences
and/or rationalities, actors in a gaming-simulation are real people, who possess a broad range of personal experiences, intuition and tacit knowledge, which they can use to play the game strategically, to form coalitions, and to learn from the technical system (Mayer, 2009). Yet, all within the safe boundaries of a game, in which actors are not judged based upon the final outcomes (Mayer and Veeneman, 2002).

Over the past years the gaming-simulation has become more and more accepted as a research method within the scientific community. Critics initially focused on the impossibility of gaming-simulations to replicate results. On the other hand, researcher who repeatedly applied a simulation-game among different groups, found consistent behavioral patterns. The method has previously been successfully applied to study the role of trust in logistic chains (Meijer et al., 2006), to design and evaluate container terminals (Mayer et al., 2004), to study the influence of future scenarios on the development of urban networks (Mayer et al., 2005) and to assess the strategic behavior of actors under different regulatory regimes within the liberalizing energy sector (Kuit et al., 2005).

In all, we believe a gaming-simulation can provide a semi-experimental test for the posed hypothesis. However, secondary to this aim, we also hope that the policy actors who play the game will become convinced of the effectiveness of the proposed alternative governance model. This, we believe, is a necessary step to address the social side of the problem of aircraft noise.

VI. Conclusion

This paper aimed (1) to provide a review of the social-psychological determinants of (aircraft) noise annoyance, (2) evaluate Schiphol’s noise policy from a social-psychological perspective and (3) review a governance model that can effectively address non-acoustic factors in noise policy. We can conclude that the influence of non-acoustic factors has been established in numerous studies, which used different methodologies (experiments, field surveys) and which applied different theoretical models (stress-theory, discourse model). The non-acoustic factors (i.e. control and trust) inform us that local actors in the relationship ‘airport-environment’ should have the means to adjust to each other’s presence. However, within the present aircraft noise policy aggregated/collective claims have become dominant (i.e. mainport and annual energy-equivalent noise norms). These are ineffective in representing and regulating the social conflict between the airport and its environment. Polarization, distrust and lack of control (noise annoyance) are resultants, explaining the large discrepancy between relevant objective and subjective outcome indicators of the policy. To address this omission in noise policy Stallen et al. (2004) have previously developed an innovative governance model, in which local actors are given room to formulate their specific individual preferences and establish transactions between them. The basic idea of this model that, in a situation, in which two neighbors can hold each other accountable for the promises made, a social context of trust will be created. Within this context, aircraft noise will still be present, but may become a lot less annoying.

References


