Study on Shaking and Damages of Super High-Rise Residential Buildings During The 2011 Off The Pacific of Tohoku Earthquake Based on Questionnaire Survey

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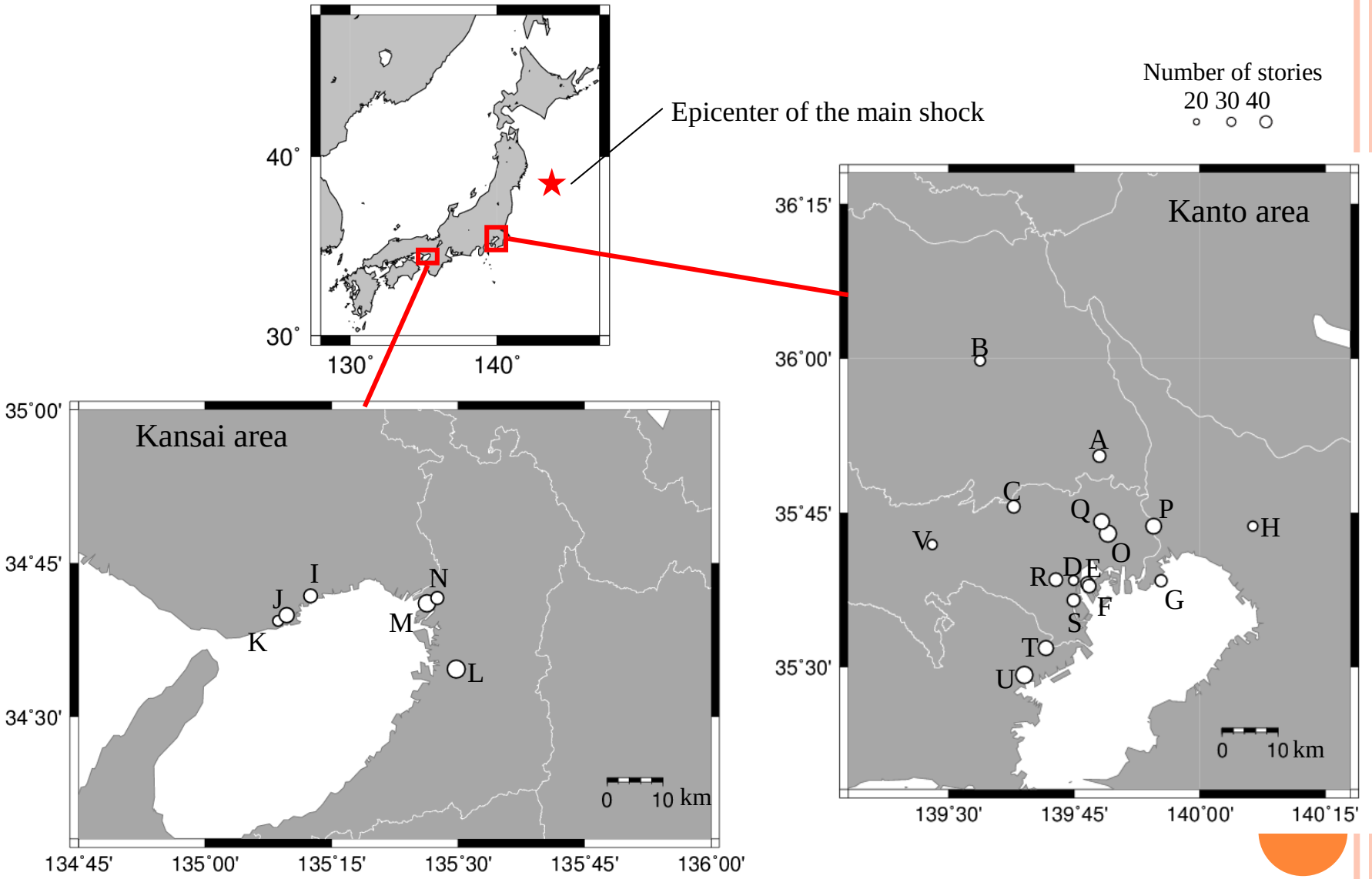
Introduction

The questionnaire survey about the shaking and the indoor damages was conducted for the residents who living in the RC super high-rise residential buildings during the 2011 off the Pacific coast of Tohoku Earthquake.

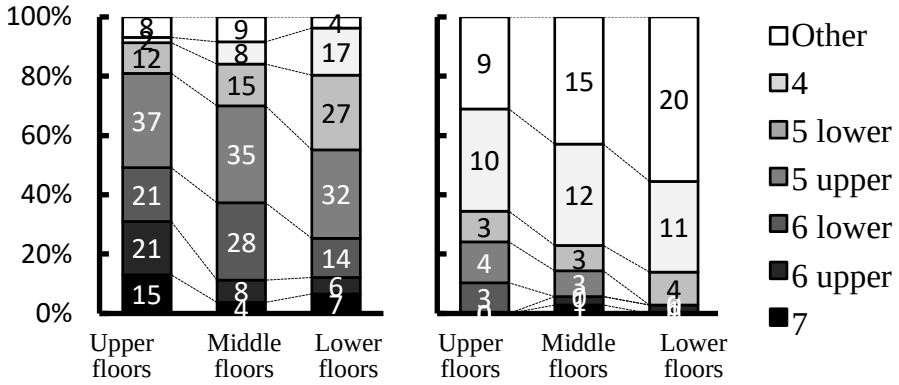
The degree of anxiety, the difficulty in taking responsive action experienced by the residents and the percentage of furniture that moved or overturned in rooms in these buildings were investigated.

Then, the relationship between strong motions and feelings of the residents and interior damages to these buildings was investigated.

Construction site maps of target buildings

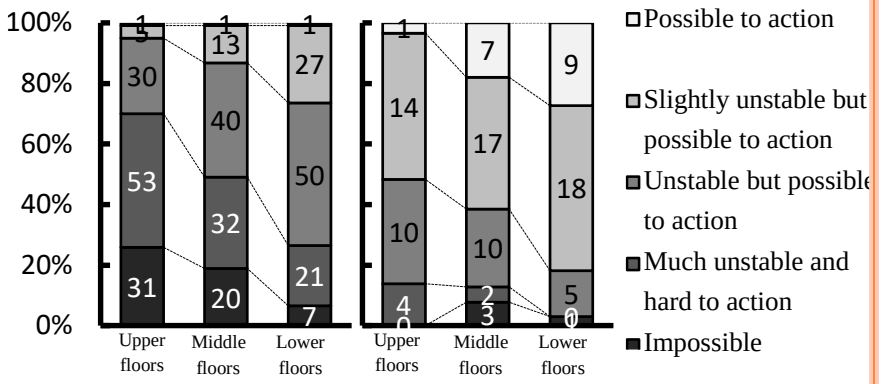


Result of the answer (1)



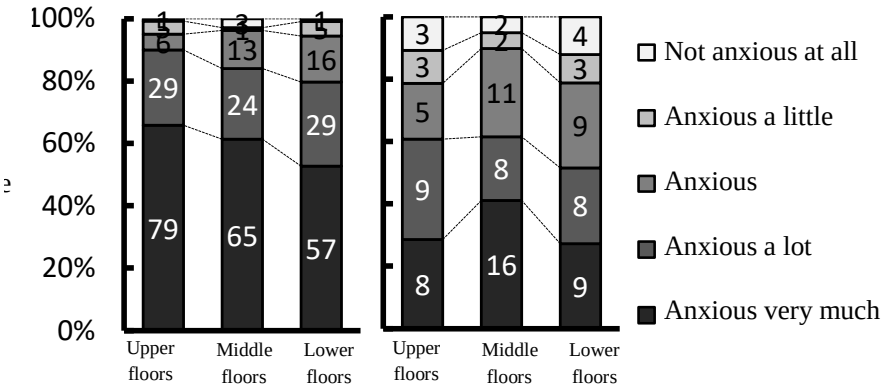
(a) Kanto area (b) Kansai area

seismic intensity



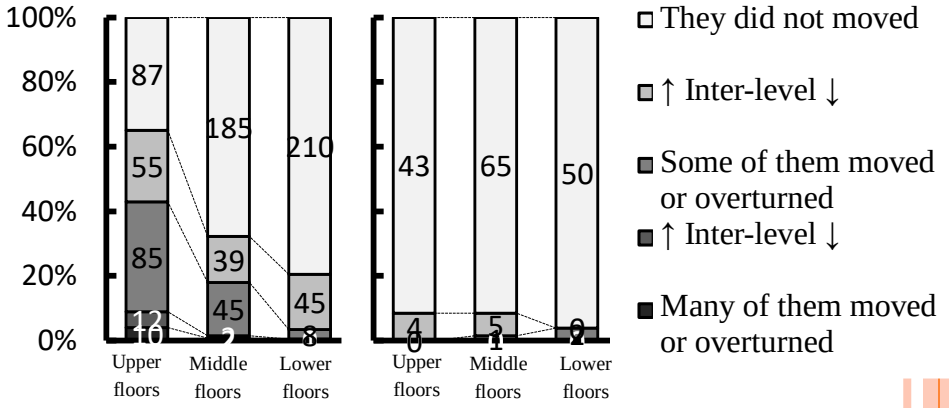
(a) Kanto area (b) Kansai area

Difficulty in movement



(a) Kanto area (b) Kansai area

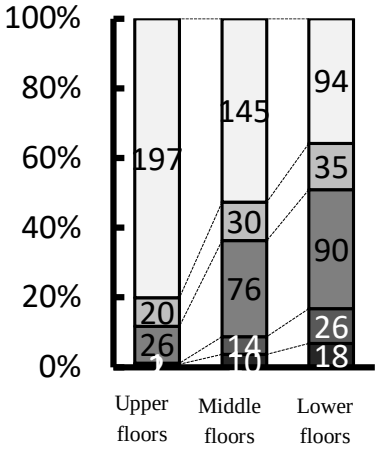
Anxiety

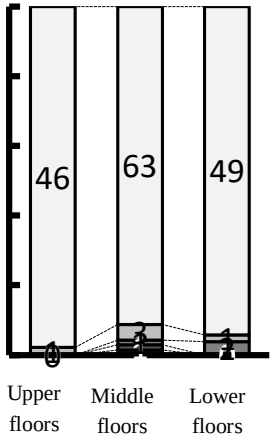


(a) Kanto area (b) Kansai area

Situations of tall furniture

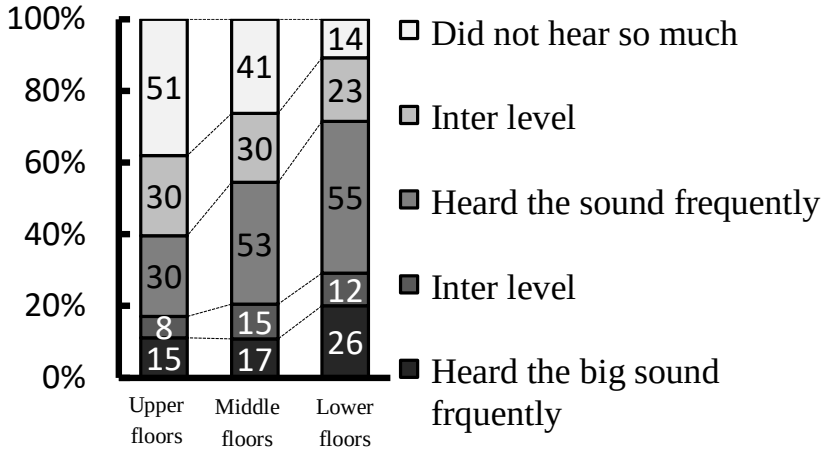
Result of the answer (2)



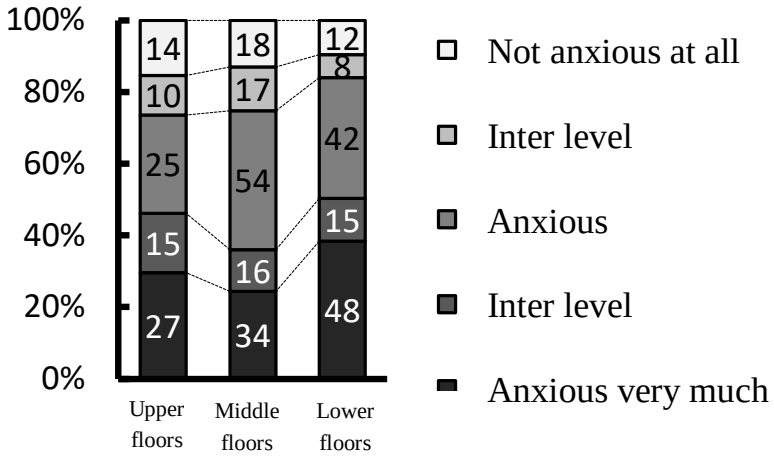


(a) Kanto area (b) Kansai area

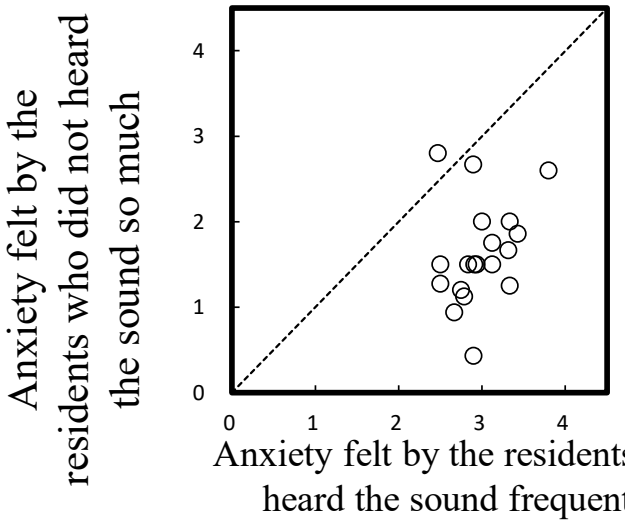
Cracks in interior materials



Grating sound of building

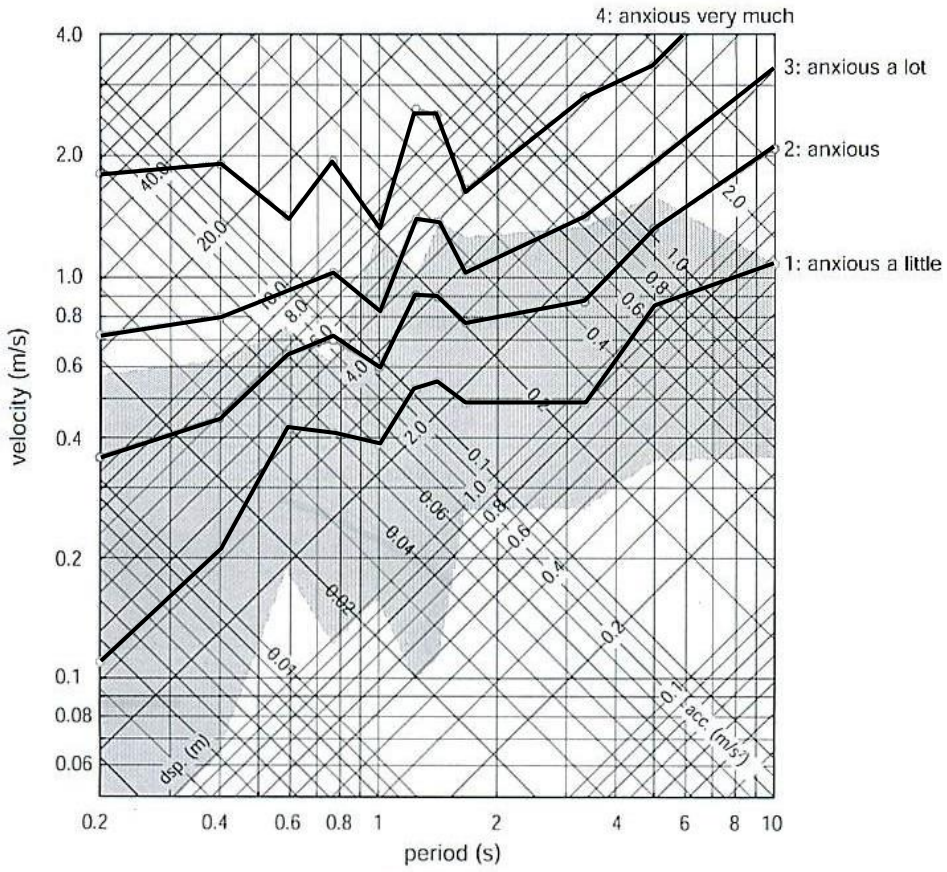


Anxiety caused by grating sound of building

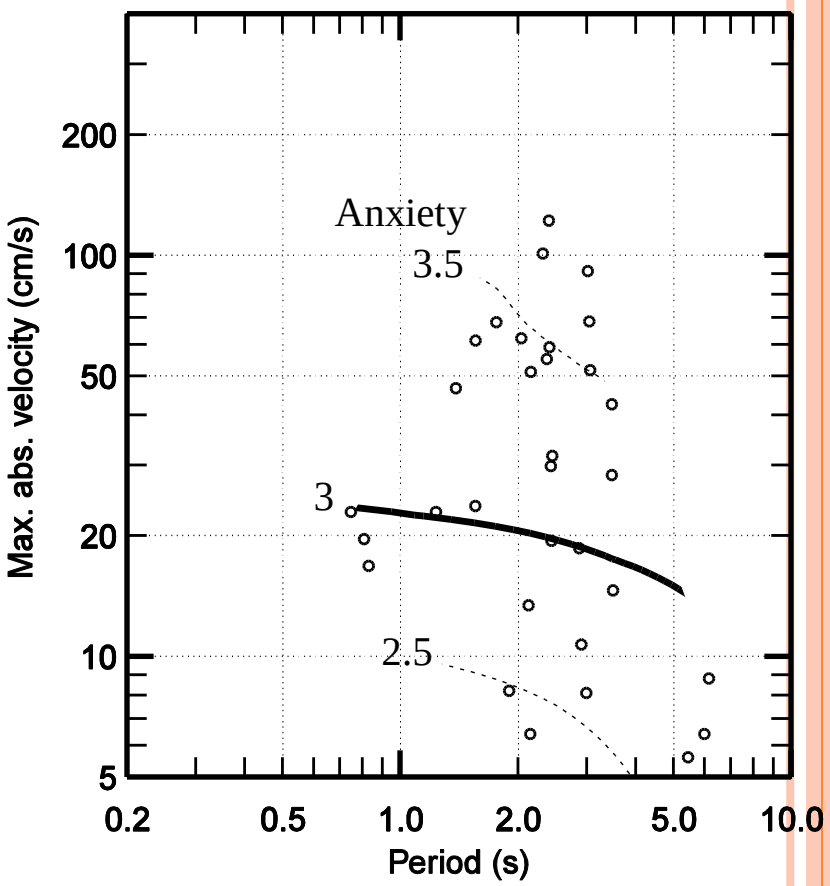


Relationship between the anxiety felt by residents who heard grating sounds frequently and those who did not hear the sounds to such a large degree

Evaluation curve of anxiety

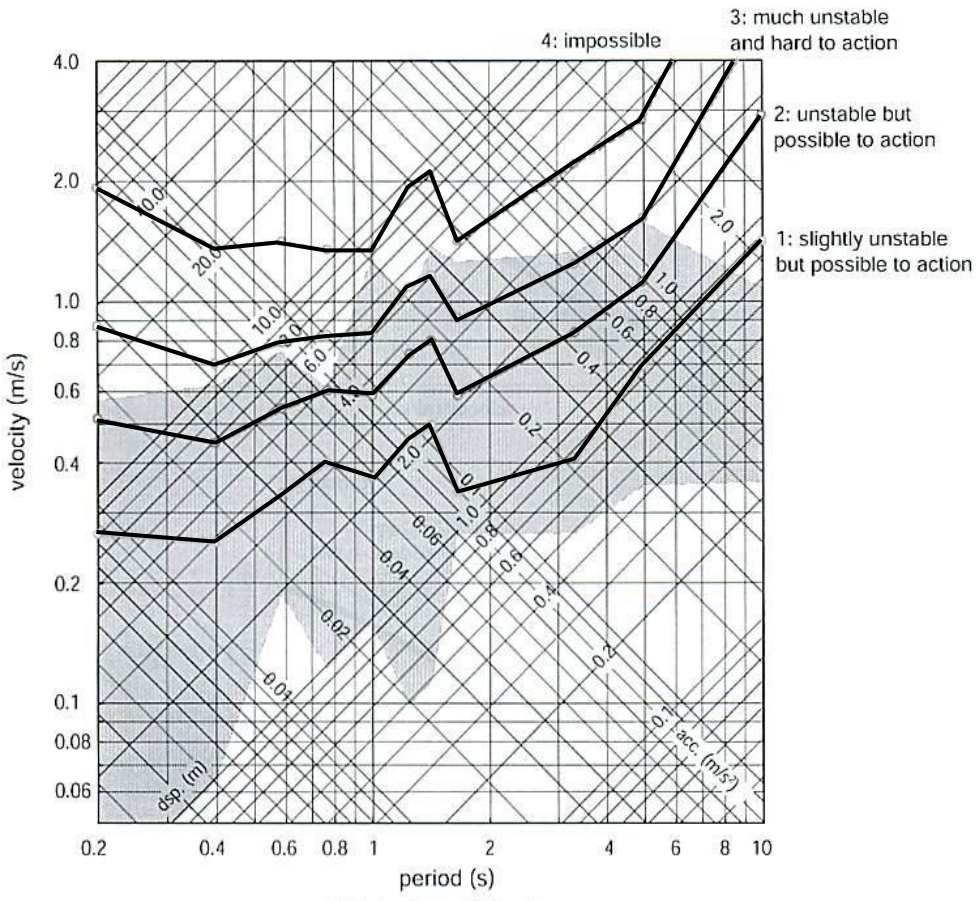


a) Shaking table test
(Past study)

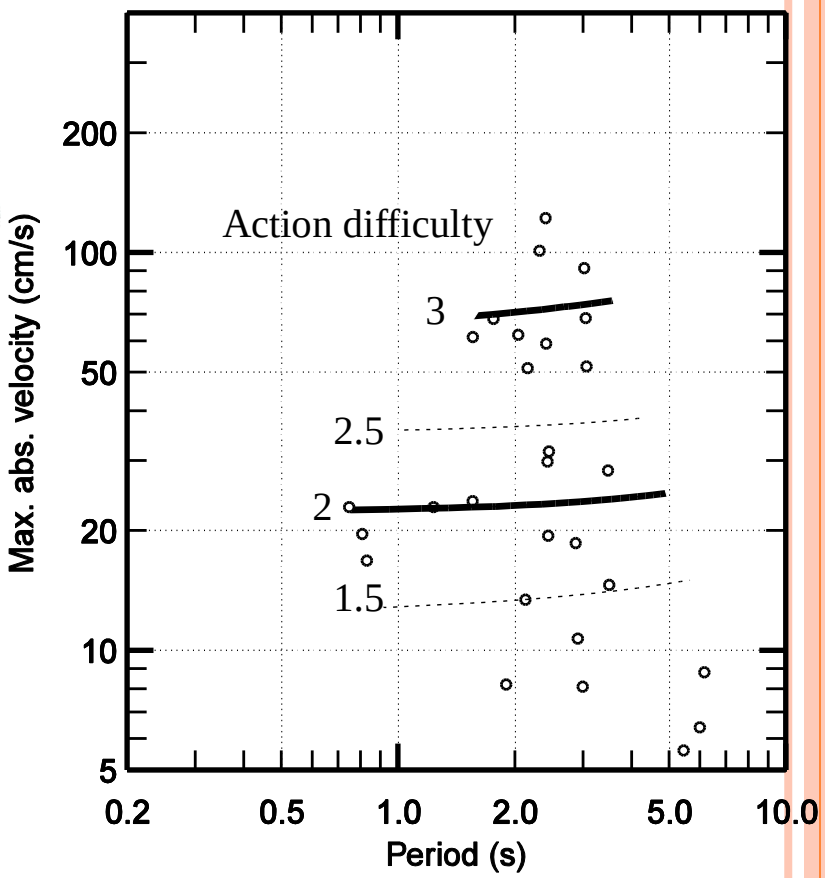


b) This study

Evaluation curve of difficulty in taking action



a) Shaking table test
(Past study)



b) This study

CONCLUSION

1) The higher the floor level, the higher the difficulty in movement was experienced by the respondents during the main shock. This suggests that difficulty in movement tends to increase with seismic intensity.
2) Many furniture were moved or overturned on the upper floors of buildings in the Kanto area. This indicates that the greater the shaking intensity, the more furniture were moved or overturned.
3) A lot of interior materials cracked on the lower floors in the Kanto area. Many residents commented that their feelings of anxiety were heightened by grating sounds produced by cracking of the interior materials or buildings during the main shock or during aftershocks.
4) The feeling of anxiety and the difficulty in taking action in this study were higher than in a shaking table test in the past study.