Human perception of traditional materials has been shaped by multiple
legacy factors. Substances such as wood, clay, glass have been around
since before the mankind and our means of handling them as well as our
emotions when being surrounded by such materials are influenced by
civilization and culture we belong to. For many purposes materials
developed in the modern age, such as plastics, have substituted the
traditional ones. Still, structural properties of those materials do
not radically challenge our perception.
Recently, materials have been
developed that exhibit properties not readily available in nature.
These materials called metamaterials show tremendous potential for
technological advancements. They can influence electromagnetic waves
in the way which allows creation of ultra strong microscopes,
invisibility cloaks and high gain radio antennas.

A subclass of them,
so called acoustic metamaterials, can guide sound waves in a fashion
which contrasts the traditional materials' physics.

However, the early stage of the metamaterial development, which we are
in right now, does not provide much intuition behind the human
perception of metamaterials. We speculate that novel properties of
these materials will result in radically different human experience
when the ubiquitous contact is finally made. Moreover, we feel that
the lack of cultural and societal boundaries will result in the primal
emotion when we start interacting with metamaterials.

As an early, yet comprehensive empirical analysis of human -
metamaterial interaction we propose the metadome. The metadome is a

flexible arts installation and a testbed for metamaterials research.
It is envisioned as a spacious dome that hosts an abundance of
interactive metamaterial content. The metadome is equipped with
numerous sensors that keep track of the user behavior. The user
actions are then transferred to the dome representation through
electric stimuli that change the properties of the material which the
user interacts with, essentially creating an emotional feedback loop.

The metadome is not a single user space. Through their interaction
with the flexible environment the users indirectly impact each other's
experience. Moreover, the structure is envisioned as an integral part
of its immediate surroundings. The building walls will allow a level
of transparency, while the acoustic metamaterial insulation can extend

the aural perception of space for the people within the building.

In this project we sketch the initial research directions towards the metamaterial-human interaction understanding. We will outline the metadome, a facility for the direct, interactive contact with metamaterials and define the key concepts needed for the structure realization. We plan to present the metadome through audio and video simulation of the metamaterial behavior. Finally, we will investigate the use of data from sensed human reaction to steer the future technical research on metamaterials.

References:

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