This is Yellowhammer," says Marcus Coates excitedly, pointing at a video of a man reading a newspaper over breakfast. Suddenly, the man's eyes dash from side to side. His chest twitches up and down, and he bursts into an orgy of twitting and tweeting. "He sat there singing for an hour and ten minutes," says Coates. "Watch: his mannerisms are so bird-like."

Yellowhammer is one of a cast of characters Coates has created for an extremely odd video installation, to be shown at Baltic in Gateshead next month. Dawn Chorus, which recreates the sound of birdsong using human voices, is an ambitious project, with scientific as well as artistic goals — medical research charity the Wellcome Trust sponsored him, and the birdsong has been archived for researchers.

Coates will go to extreme lengths to get what he wants. For Dawn Chorus, he spent a week camping with a wildlife sound recordist, Geoff Sample. The pair lived in a motorhome in Northumberland, getting up at 3am to activate a 24-track digital recorder. They collected 576 hours of birdsong in all — robins, whitethroats, wrens, blackbirds, song thrushes, yellowhammers, greenfinches. Coates says he became obsessed with Sample's ability to tell birds apart — not just by species, but individually. "He'd say, "Oh, that's that robin doing a bit of blackcap. He knows birds by the way they start or finish a phrase. We had two robins — I can't tell them apart, but Geoff can."

On their final morning, they placed microphones around a patch of woodland, hoping to capture the song of 14 individual birds at dawn. Then, back in his Bristol studio, Coates slowed the recordings down by up to 16 times, making the birdsong sound like a conversation between the Clangers. He recruited a choir to sing, whine and groan along to these strange sounds while being filmed at dawn in their own "natural habitat" — in the bath, in a taxi, in the kitchen. When the film is speeded up, the "birdsong" comes to life, the subjects twitting away like real birds. Blue Tit is a woman lying in bed, fluttering her eyes and whistling through a puckered mouth. Linnet is an osteopath, nodding and blinking furiously and putting up his chest in his consulting room.

Most of the subjects are amateur singers from Bristol, hand-picked at choir rehearsals. Chaffinch is Pearl Conway, 62, a nurse at the burns unit in Bristol's Frenchay Hospital and a member of a ladies' barbershop choir, the Avon Belles; she is pictured cheeping away in a hospital waiting room. "Some of the notes were tricky," she says, "but I gave it my best shot. It did go on: it lasted about an hour."

"It was quite meditative," says Blackbird, aka Piers Partridge (yes, that's his real name), a musician from Bristol who was filmed in his garden shed. "I found myself going deeper and deeper into the quality of the sound." Partridge found that he could predict where the "Clanger" sounds were going. "The blackbird had one or two favourite riffs, so I'd think, 'OK, here he goes.' I imagined myself as a blackbird on a spring morning, very early in a high place, having that freedom not to think but just let the sound come out. With that came some interesting movements — I was cocking my head to look around. I felt really spaced out. When it finished I was miles away."

Coates, 38, is getting something of a reputation as a one-off. His work has been described as quintessentially British, focused on the boundary between the human and the animal. For his best-known piece, Journey to the Lower World (2005), he dressed as a stag and performed a shamanic ritual for the residents of a condemned tower block in Liverpool. Next month he will dress as a badger for a similar ritual at the Hayward Gallery in London. His 40-minute film A Guide to the British Non-Passerines (2001) has him mimicking 97 bird species, and for a photographic project, Goshawk, he strapped himself 20ft up a tree in an attempt to become a rare bird of prey.

Coates' projects seem half-joke, half-serious; he talks with intense passion about each of them, but is quick to point out their ridiculous elements. This seems to be part of the experiment: it's as much about discomfort and the surreal as about animal metamorphosis. His ideas evoke a child-like desire to "become" an animal or a bird and, strange as they are, they are oddly moving.

He trained as a painter at the Royal Academy of Art, and says he has been fascinated by the British birds and wildlife since childhood. "I grew up in Harpenden, in suburban life, always this exotic thing because it was so limited. There was a tiny wood next to our house and my brother and I would see these birds and go home and draw them. We'd always think we'd seen a honey buzzard and it would turn out to be a crow. I thought for a long time being an artist was about making art, but in fact it's about representing what you are passionate about."

Coates' installation should sound like the original dawn chorus: the screen playing the music will be placed in exactly the same positions as the microphones in the wood where the birdsong was recorded. Coates says he hopes to apply the method again; he recently went to Japan to experiment with Japanese birds and singers. But the Baltic exhibition, he feels, is quintessentially British, because of our attachment to wildlife. "It's outside the human lifestyle because we get up too late," he says. "I want to create something you could experience again and again."

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Dawn Chorus by Marcus Coates is at Baltic, Gateshead, from February 14 to March 18, and at The Festival of Birds at St George's, Bristol, on March 24.